LEAN IMPLEMENTATION DIFFERENCE BETWEEN LEAN MATURITY, PSYCHOLOGICAL WELL-BEING, AND EMPLOYEE ENGAGEMENT OF NURSES IN A HOSPITAL SETTING

by

Kevin E. Smith

Liberty University

A Dissertation Proposal Presented in Partial Fulfillment

of the Requirements for the Degree

Doctor of Philosophy

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APPROVED BY:

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ABSTRACT

This quantitative study examined the differences of Lean implementation in three settings; (a hospital in a health system where Lean is implemented throughout the system, a hospital that has implemented Lean in a health system that has not implemented Lean, a hospital that has not implemented Lean in a health system that has not implemented Lean) between LM, PWB, and EE among nurses in a hospital setting. The theoretical construct of the job demands-resources model is used to base the study. Three survey instruments (Psychological Well-Being Scale, Utrecht Work Engagement Scale, Lean Healthcare Implementation Self-Assessment Instrument) were self-administered by registered nurses over 18 after consent. A Kruskal-Wallis test was conducted based on parametric assumptions violations. Results demonstrate a Lean implementation alone may not be enough of a resource to influence EE and PWB, however, does influence LM within the JDR construct. Focus on additional resources while doing a Lean implementation may enhance the EE and PWB of nurses within the hospital setting. The benefits of this study will provide healthcare leaders with an empirical understanding of Lean as a continuous improvement tool and how it impacts nursing emotions and behaviors. Additional benefits include assisting healthcare organizations, consultants, and academicians with tactics that could demonstrate continuous improvements and cultural improvements through an industrial-organizational psychology lens.

Keywords: Lean, healthcare, hospitals, psychological well-being, employee engagement, nursing, job demands-resources model

Copyright Page

Dedication

I dedicate my dissertation work to my wife and children. They have been loving and supportive in my academic journey while leading a life of as a Christ centered hospital administrator that is a devoted husband to a loving wife, Diana, softball dad to my daughters Emily and Abigail, and musical theater dad to my daughter Katy.

Acknowledgments

I would like to acknowledge all my peers, colleagues, mentors, and teachers throughout my professional and academic journeys. It is through meaningful life experiences that challenged me to pursue a higher level of learning. I thank everyone involved for their support.

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CHAPTER 1: INTRODUCTION TO THE STUDY

Introduction

Healthcare has a call to action and Lean could be a valuable tool in the quality of healthcare delivered. According to Rosen et al. (2018), healthcare may be attributable to exceeding 250,000 deaths per year. The areas of harm include hospital acquired infections, patient falls, diagnostic errors, and other process breakdowns within the industry creating the urgency for an emphasis of teamwork for quality, safety, and care delivery. Lean is a process improvement methodology with origins in manufacturing from Japan and was originally referred to as the Toyota Production System (TPS) (Bortolotti et al., 2015; Roemeling et al., 2017; Radcliffe et al., 2020). Beginning in the first of the 2000s, healthcare companies began to adopt Lean practices but have had varying degrees of success based on implementation and culture strategy (Dorval & Jobin, 2019). Research has demonstrated a significant difference between high Lean high performing companies and high Lean low performing companies within cultural dimensions of soft Lean practices such as continuous improvement ($x^2 = 4.193$, $p < 0.001$), training employees ($x^2 = 7.342$, $p < 0.001$), small group problem solving ($x^2 = 4.236$, $p < 0.001$), supplier partnership ($x^2 = 3.964$, $p < 0.001$), and customer involvement ($x^2 = 4.008$, $p < 0.001$) (Bortolotti et al., 2015). The main goal of Lean is to reduce waste within processes that creates efficient workflows with fewer resources using a continuous improvement structure based upon respect for people that engages and empowers employees and leaders (Balzer et al., 2019; Coetzee et al., 2019a).

There are four broad categories that are essential to Lean. First, focus on long-term outcomes regardless of short-term success. Second, identify root cause of process

problems. Next, ensure culture permeates from leadership down to employees and back up with the expectation of teaching and learning the system. Finally, when solutions are identified they are implemented quickly (Balzer et al., 2019; Hallam et al., 2018). Within Lean, Weintraub et al. (2021) noted employee autonomy and meaningful goals can be improved using the SMART goal method of specific, measurable, attainable, relevant, and time bound. Specific is defined as targeting a narrow and precise area of improvement. Measurable is defined by a quantification that suggests an indicator of progress. Attainable is defined as whether the goal can be accomplished. Realistic is defined as whether the goal can be achieved with the given resources. Time bound is defined as when the goals can be achieved. SMART goal setting can also improve workflows and is important to direct employees and motivate them for success while also engaging them.

Background

Lean does not have much of a focus on employee behaviors or emotions in industrial organizational psychology literature (O'Brien & Forman, 2019; Rauvola & Thomas, 2019). Lean research needs to evolve into contributing frameworks for removing process waste from organizations while also addressing the employee needs such as employee psychological well-being (PWB) (von Thiel Schwarz et al., 2017) and employee engagement (EE) (Taylor et al., 2020). PWB is a mental state that encompasses 6 dimensions of wellness (autonomy, environmental mastery, personal growth, positive relations with others, purpose in life, self-acceptance) (Ryff & Keyes, 1995). EE is a state of mind assessed on a scale that can range from positive to negative that reflects positivity and fulfillment with high levels of energy and involvement in the job (Lesener

et al., 2020). Additionally, EE measures the experience in employee work defining a feeling or attitude linked to three factors (vigor, dedication, and absorption) Tomietto et al., 2019).

According to Kosaka and Sato (2020), academicians and industry use the term work engagement and employee engagement interchangeably. There is an argument made that the terms are differentiated between engagement with the job (work engagement) and engagement with the company (employee engagement). There is a widely accepted survey instrument for assessing engagement with the job, however, there is not a widely accepted survey instrument for measuring engagement with the organization. Therefore, for the purposes of this study, employee engagement will be the term utilized in reference to engagement with the job as it is accepted in literature.

According to Holmemo et al. (2018), consulting firms do not engage in soft practices that focus on emotional experiences due to the focus on the more immediate outcomes and results of Lean. As a result, the sustainability of such consulting assignments can be at risk. While strategy and execution are positive contributors to Lean, healthcare leaders should implement strategies to decrease the burden of job demands that lead to poor employee behaviors and burnout (Lee et al., 2021). The success of Lean implementation is contingent on managers committing to and involving themselves along with EE of a multidisciplinary staff working as a team (Netland, 2016; Radcliffe et al., 2020).

A strategic Lean roadmap is another factor in Lean implementation and sustainability that is often overlooked in literature with short term gains being favored (Silvério et al., 2020, Staedele et al., 2019). Lean organizations need human resource

practices that leadership can rely on to support the implementations and ongoing operations (Zirar et al., 2020). While leaders need the infrastructure and planning to implement Lean, they also need to understand what values and behaviors are needed to be successful (van Dun et al., 2016; van Dun et al., 2017).

Biblical Foundation

Paul wrote in 2 Timothy 2:15 (*English Standard Version*, 2001), "Do your best to present yourself to God as one approved, a worker who has no need to be ashamed, rightly handling the word of truth." From a biblical worldview, work is pleasing to God and conducting work in a manner that honors God is within His design. Research that is allowed by God to study Lean, PWB, and EE is within His intricate design. Romans 1:20 states, "For his invisible attributes, namely, his eternal power and divine nature, have been clearly perceived, ever since the creation of the world, in the things that have been made".

Problem Statement

The foundations of Lean are intended to benefit workplace culture by eliminating wasteful processes that mitigate process variation (Balzer et al., 2019; Coetzee et al., 2019a). From an operational perspective, Lean principles were introduced in 1996 becoming a common methodology used in organizations (O'Brien & Forman, 2019). Healthcare settings that have implemented Lean have had success with outcomes of decreased process variation but limited studies of the implementation of Lean have shown improved PWB and EE (von Thiele Schwarz et al., 2017). The benefits of Lean have been studied by researchers often, however, the impact that Lean has had on people within the organization has not been a strong focus of research (Balzer et al., 2019;

Hallam et al., 2018). Cultural benefits of Lean that could improve PWB and EE would demonstrate Lean as a tool for business.

Lean is not well studied by industrial organizational psychologists on the benefits it may have for PWB and EE creating an opportunity for the industrial organizational psychology researcher (Rauvola & Thomas, 2019). A gap present in literature, based on review, is whether there are differences with Lean implementation and Lean maturity (LM), PWB, and EE of nurses in a hospital setting. Studies have shown value of Lean with regards to process improvement but have lacked the rigor to connect Lean to PWB and EE (Balzer et al., 2019; Naga et al., 2014; Roemeling et al., 2017).

Purpose of the Study

The purpose of this quantitative study was to examine the differences of Lean implementation in three settings; (a hospital in a health system where Lean is implemented throughout the system, a hospital that has implemented Lean in a health system that has not implemented Lean, a hospital that has not implemented Lean in a health system that has not implemented Lean) between LM, PWB, and EE among nurses in a hospital setting.

Research Question and Hypotheses

Research Question

RQ1: Is there a difference between Lean maturity, psychological well-being, and employee engagement among registered nurses in a hospital setting at three levels: a) a hospital in a health system where Lean is implemented throughout the system, b) a hospital that has implemented Lean in a health system that has not

implemented Lean, c) a hospital that has not implemented Lean in a health system that has not implemented Lean?

Hypotheses

Hypothesis 1_0: There is not a difference with a Lean implementation in a hospital setting at three levels: a) a hospital in a health system where Lean is implemented throughout the system, b) a hospital that has implemented Lean in a health system that has not implemented Lean, c) a hospital that has not implemented Lean in a health system that has not implemented Lean between Lean maturity, psychological well-being, and employee engagement among registered nurses.

Hypothesis 1_a: There is a difference with a Lean implementation in a hospital setting at three levels: a) a hospital in a health system where Lean is implemented throughout the system, b) a hospital that has implemented Lean in a health system that has not implemented Lean, c) a hospital that has not implemented Lean in a health system that has not implemented Lean between Lean maturity, psychological well-being, and employee engagement among registered nurses.

Assumptions and Limitations of the Study

The study population for this study is registered nurses. There is a risk of attrition of the study population based on potential instability in current nursing staff (Kakemam et al., 2021). It is assumed potential participants will answer survey instruments honestly. Social desirability may cause participants to answer survey questions that portray themselves in the best light making themselves look better (Keough & Tanabe, 2011). The potential participants will also know that they may stop participating in the study at

any given time and know that it is voluntary to participate, and some participants may abandon the survey before completing it.

Limitations that are to be expected are due to response bias of participants filling out survey instruments based on interpersonal factors such as education about the study or organizational factors such as dedicated time to participate in the surveys (Hale et al., 2022). Organizational justice issues could cause limitations such as pay equity concerns with the hospital, fair decision making, or support from supervisors (Kakemam et al., 2021). Additionally, there are limitations with getting a large enough sample size through participant email solicitation with each level that could prevent progress from moving forward with the study.

Theoretical Foundations of the Study

Job demands-resources (JDR) theory is the theoretical foundation for this study. JDR explains how the work environment can impact employee well-being based on the level of personal or professional resources and the demand or workload of the job (Tummers & Bakker, 2021). There is a direct relationship between higher resources and increased work motivation that leads to higher EE within JDR (Tummers & Bakker, 2021). While the demands of work related to healthcare are high, the resources necessary to improve well-being and EE through JDR are possible through Lean (Beraldin et al., 2019). Therefore, there is an opportunity to link Lean to PWB and EE based on the framework from JDR.

Miner and Bickerton (2020) found a Trinitarian resource model draw upon the empirical approach of the JDR model pulling together associations with relational leadership. This thought adds a relational theology such as goodness of the leader,

spiritual and God-given personal resources, and providing resources within the organization that is consistent with God's purpose and design. Weaving the theology with contemporary theory is thought to benefit well-being of the people within the organization and is an opportunity for future Christian-informed research.

Definition of Terms

The following is a list of definitions of terms that are used in this study.

Job Demands-Resources Theory – A work theory that describes how the work environment can impact employee well-being based on the level of personal or professional resources and the demand or workload of the job (Tummers & Bakker, 2021).

Lean - A process improvement methodology with a goal to reduce waste within processes to create efficient workflows with fewer resources (Balzer et al., 2019; Coetzee et al., 2019b).

Maturity of Lean – Maturity of Lean is described as the degree of Lean implementation within the domains of leadership, commitment, standard work, communication, and daily management system.

Plan, Do, Check, Act Model (PDCA) – A cycle of four phases beginning with planning phase (plan), the implementation phase (do), inspection phase (check), and processing phase (act) Pan et al., 2022).

Psychological Well-Being - A mental state that encompasses six dimensions of wellness (autonomy, environmental mastery, personal growth, positive relations with others, purpose in life, self-acceptance) defined in a theory by Ryff (Ryff & Keyes, 1995).

Employee Engagement - How often employees experience in their work a defined feeling or attitude linked to three factors (vigor, dedication, and absorption) Tomietto et al., 2019).

Significance of the Study

This study could contribute to industrial organizational psychology literature in a meaningful way that demonstrates if Lean implementation shows differences with maturity of Lean, PWB, and EE with nurses in a hospital setting. The study findings can contribute to consulting professionals and healthcare administrators' operational tactics that better design a Lean implementation and engage nursing personnel while going through continuous improvement initiatives. Understanding the benefits of Lean from a continuous improvement standpoint is important, however; understanding the nuances of how employees are engaged throughout the Lean process, and if their PWB improves, adds a different dimension to what practitioners can gain from studies such as this. Gaining improvements in organizational culture through implementation design, increased well-being, and EE while undergoing process improvement and change initiatives is beneficial to organizations. Understanding the effect on employee attitudes, feelings, and cognitive processes can assist in creating best practices. These best practices are intended to target the needs of the organization both culturally and for continuous improvement.

Summary

The impact of the Covid-19 pandemic on nursing has been noted in the public arena. The healthcare industry has a need for continuous improvement methodologies

based on quality outcomes (Rosen et al., 2018). The unfortunate reality of what healthcare workers have faced during this time alters the workplace moving forward.

Lean is a continuous improvement methodology that healthcare companies began to utilize in the early 2000s (Dorval & Jobin, 2019). Lean research in industrial organizational psychology literature has not had a focus on employee behaviors or emotions (O'Brien & Forman, 2019; Rauvola & Thomas, 2019) such as PWB and EE. Using the theoretical background of JDR there is an opportunity to study Lean, PWB, and EE can provide an operational plan for practitioners to use when managing change or continuous improvement. From a biblical perspective, Miner and Bickerton (2020) used the JDR model demonstrating goodness of the leader, spiritual and God-given personal resources, and providing resources within the organization that is consistent with God's purpose and design will benefit employee well-being. God's overall design can be explored further in Christian based research.

Next, Lean literature will be reviewed from definition and historical beginnings to the role Lean has in healthcare. PWB and EE will be reviewed in the context of Lean and healthcare followed by the bases of JDR as a theoretical foundation. Finally, a biblical foundation will be reviewed focusing on spirituality at work and workplace spiritual theories coupled with JDR.

CHAPTER 2: LITERATURE REVIEW

Overview

The job demands-resources (JDR) model will be discussed as the theoretical foundation for Lean implementation and differences between maturity of Lean, employee PWB, and EE. The characteristics of Lean will be linked to JDR through literature review demonstrating Lean as a model that could have an effect on PWB and EE. Lean will be reviewed from a historical perspective up to the inclusiveness of utilization within healthcare. The dimensions of PWB will be reviewed along with the characteristics of EE and how these variables intersect with Lean practices. A biblical foundation will be established demonstrating that spirituality at work is beneficial to God's overall designs and respects His creation. 1 Corinthians 3:9 (*English Standard Version*, 2001) states, "For we are God's fellow workers. You are God's field, God's building." Spirituality, as a construct at work, will be shown to fit within the psychological constructs that are reviewed.

Description of Search Strategy

The literature search was conducted through the advanced search function of the Jerry Falwell Library through Liberty University. The advanced search filters utilized narrowed articles that were from peer reviewed journals within psychology between 2017 and 2023. An additional search removing psychology as the peer reviewed journal type was also conducted. This allowed for a broader search of peer reviewed literature using specific search terms. Finally, an additional search by all years prior to 2017 was conducted to identify seminal literature on psychological instruments and early Lean literature. Search terms utilized were Lean, Lean and healthcare, Lean and nursing,

spirituality and healthcare, spirituality and work, spirituality and nursing, EE, Lean and EE, psychological well-being, Lean and psychological well-being, job demands-resource theory, job demands-resource theory and Lean, job demands-resource theory and nursing.

Biblical research was conducted utilizing the website openbible.info. Openbible.info allows a user to search bible verses based on key words used. Key words used for biblical research were work and engagement yielding several bible verses. Bible verses were reviewed for relevance against the research area of interest.

Review of Literature

Lean

Balzer et al. (2019) defined Lean as a comprehensive management system grounded in respect for people and continuous improvement that aims at problem solving benefiting the customer, employee, and organization. Lean focuses on engaging and empowering employees and the self-development of leaders. The overall purpose is to remove all forms of waste while improving the flow of processes consuming the fewest resources. Success requires leadership commitment with a long-term strategic approach to the overall operating system. Lean as spread throughout many businesses and industry both in the United States and world (Antony et al., 2019).

Historical Beginnings of Lean

Lean, as a term, was first introduced by Krafcik in 1988 and further defined by Womack et al. (1990) within, *The Machine That Changed the World: The Story of Lean Production* (Balzer et al., 2019). The manufacturing roots from Lean were originally referred to as the Toyota Production System (TPS) Womack et al., 1990; Rosso & Saurin, 2018). Lean began during the post-World War II Japanese reconstruction and was

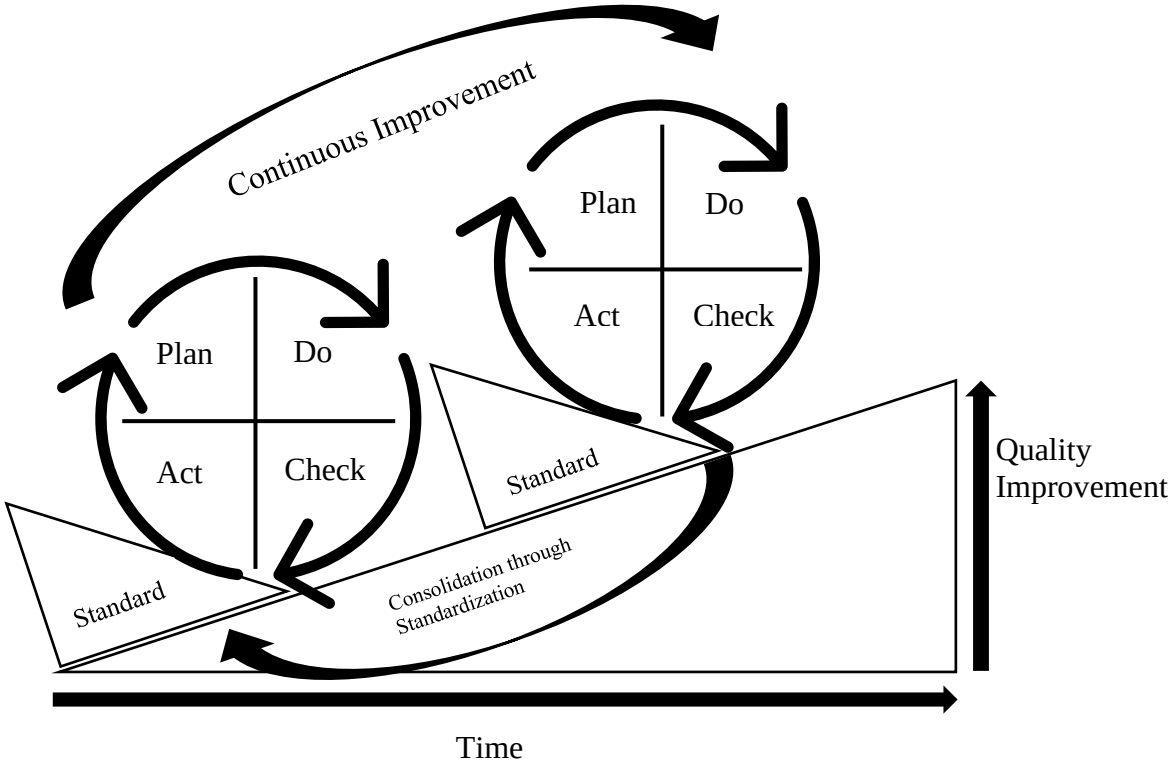
influenced by Deming's quality control and management work such as the plan, do, check, act (PDCA) model of Total Quality Management (Deming, 1986).

Lean and Plan, Do, Check, Act Model

The PDCA model is used today, in Lean, as an indicator of rapid improvement cycles of experimentation with employee ideas as the standards indicated in Figure 1. The aims of Lean are to reduce waste in processes that create efficiency in work with fewer resources using a formal structure with a focus on respect for people (RFP) engaging and empowering employees and leaders (Balzer et al., 2019). Lean engages team member ideas, in an RFP environment that, decreased waste while improving organizational performance and bringing value to the customer (Dekier, 2012).

Figure 1

PDCA Process



Note. From *PDCA Process*, by J. Vietze (2013), https://openverse.org/image/f5b0da16-27a1-4d0f-a091-4353fa55a70a?q=pdca. CC BY-SA 3.0.

Lean, Change, and Autonomy

Change is difficult in organizations and begins with top leaders exhibiting change management behaviors and identifying change champions that can support company goals leading into a Lean implementation (Jansen et al., 2016). Additionally, van Dun et al. (2017) found that Lean managers need to be honest, have participation and teamwork, be responsible, have candor, support continuous improvement, and have openness to change to be effective leaders in Lean implementations. A significant component of success is when leaders support autonomy with their teams. Additionally, Driskell et al.

(2018) found an increase in team autonomy is positively linked to motivation and learning behaviors while negatively being linked to strain and emotional exhaustion. Specific tactics that support team autonomy are skill variety, task identity, task significance. Skill variety is the ability for an employee to use their knowledge, skills, abilities, and other characteristics in their job. Task identification is when an employee is allowed to produce work related to a tangible outcome. Task significance is when an employee feels their work has a significant impact on their life or others.

Based on research from Cullinane et al. (2017), Lean allows for employees to have more autonomy and skill utilization causing them to seek resources leading to higher work engagement. This is due to Lean providing more training allowing employees to be knowledgeable about problem solving instead of merely performing a simple task. As a result, there is more task interdependence, and employees feel empowered to solve problems and seek resources to greater challenges. This also correlates with an increase in motivation due to the supportive leadership model that allows employees influence ~~on~~ their job crafting.

According to Slemp et al. (2018), leader autonomy support (LAS) is a framework that integrates within Lean management structure of respecting people. LAS not only improves motivation in employees but can also benefit employee well-being and is positively associated with basic needs being met. When employees feel that they have the competency to contribute, relatedness, the ability to develop relationships and connections with others, and autonomy their overall well-being increases, and they have reached optimal psychological functioning.

Lean, Culture, and Attitudes at Work

Bouville and Alis (2014) demonstrated there can be negative relationships with regards to delegation of responsibilities, problem-solving, standardization, all components of Lean, harming attitudes at work. The act of implementing Lean alone is not enough and managers need to consider a holistic approach to implementation (Bouville & Alis, 2014). Knowing that Lean has implications on culture and attitudes allows for industrial-organizational psychology to play a more meaningful role in Lean research. Because industrial-organizational psychology and Lean behaviors do not often intersect, the opportunity is readily available for worker experience to be the bridge between theoretical frameworks between traditional industrial-organizational psychology and Lean (O'Brien & Forman, 2019). Both industrial-organizational psychology and Lean have a focus on attitudes, culture, and process. While both disciplines have the latter commonalities they are not as present together in research, however, bringing them in the research field together can validate the methods used to address culture and attitudes with human behavior that lead to successful implementations (O'Brien & Forman, 2019).

The concept of bringing an emphasis to the culture, attitude, and behaviors of employees undergoing a Lean experience is rational considering the goal setting and motivational research that is available. Goal-setting theory by Locke and Latham (2012) is based on conscious goals affecting actions that are typically conducted within a specified time frame. When setting goals, the more specific the goal and guidance an employee must attain the goal the better the performance. When an employee is simply asked to "do your best" the success of completing the goal is lower. Additionally, Latham

(2012) discovered that work motivation is positively related to worker autonomy and goal setting leading to higher levels of worker engagement, satisfaction, and intent to stay employed at their current position. When a worker has the autonomy to share ideas that are designed to assist and meet specific and complex goals, they feel they bring value to the organization creating higher motivation and in turn higher satisfaction (Latham, 2012).

Jungert et al. (2013) discovered that motivation is positively related to autonomy support by the leader but also increased over time with autonomy support by co-workers. Autonomy support is described as the interpersonal style of a leader who considers the perspective of the employees and engages them in the decision-making process. Employees with autonomous motivation are happier at work, have less turnover, and perform higher while also having higher resilience, learn better, and are more creative.

While attitudes and culture are important within Lean and industrial-organizational psychology research, the culture and attitudes between people in the workplace is another dynamic that is meaningful in Lean research. A phenomenological and case study research design in a United Kingdom healthcare setting by Taylor et al. (2020) revealed that emotional experiences between participants in the study did affect the Lean implementation. This is based on how people feel about themselves, relationships with others being influential, and the mental, physical, and emotional effort involved in the training and implementation itself. Additionally, clusters of key words are identified in literature indicating an emphasis on people. Dorval and Jobin (2019) found key words related to Lean in healthcare literature through a computer aided text analysis of popular Lean reference books indicating patient, people, and team as top key words

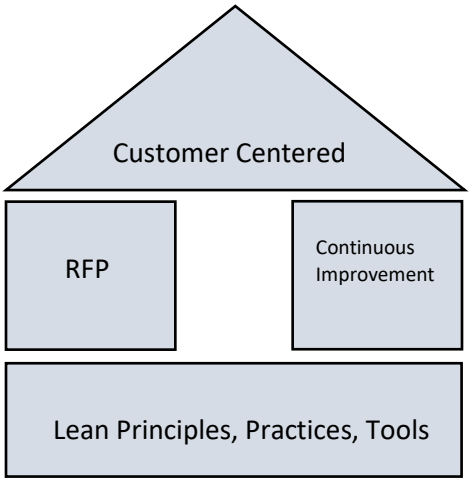
other than Lean structural words. This could indicate the significance of how behaviors are important to understand in organizations that are looking to undergo a Lean implementation. Focus should not just be on the structure and training but also on the cultural aspects of the implementation that impact the value of worker time, EE, and job security (Dorval & Jobin, 2019).

Respect for People

It is becoming clearer in literature reviewed that understanding what motivates people as individuals and within work relationship experiences is an important component to Lean implementations (Coetzee et al., 2019a). In the Lean methodology Balzer et al. (2019) described a Lean House Model, shown in Figure 2, with the following parts: a) a foundation made up of Lean principles, practices, and tools critical to implementation efforts; b) a roof that represents the ultimate aspirational goal of customer focus (best quality, lowest cost, greatest value); c) two pillars representing the core beliefs and culture of the organization that are holding the roof. One pillar is continuous improvement representing a culture of relentless improvement and the other pillar is respect for people which is critical to Lean focusing on success that is best for the organization, employees, and customers. It is important to note the RFP pillar makes up the essence of the cultural building blocks of the house.

Figure 2

Lean House



Note. This model provides a visual of the Lean methodology. From "Revolution or 30-year fad? A role for I-O psychology in Lean management," by Balzer et al., 2019, *Industrial and Organizational Psychology, 12*(3), 215-233. https://doi.org/10.1017/iop.2019.23

RFP being a pillar of Lean cannot be understated for the importance in a Lean implementation. Without RFP it is difficult to get full engagement from workers with Lean implementation (Coetzee et al., 2019a). There needs to be an RFP influence that empowers workers to share their ideas that contribute to continuous improvement creating value for both them and the organization (Balzer et al., 2019). Coetzee et al. (2019b) found that RFP practices were important in Lean implementations based on the Japanese tenets of the original Lean philosophy. Japanese culture has a professional decorum of respect for elders and professional management structure that is included within their societal expectations. Additionally, RFP cultural practices needed to be considered for the success of an implementation in South Africa, the location of Coetzee

and colleagues' study, indicating an essence of RFP related to national cultures. For example, employees would not buy in to Lean practice if they felt their own job status would be placed in jeopardy if the Lean implementation were to take place.

Based on the Coetzee et al's findings other studies suggested that cultural differences that occur between Japan and Western cultures would indicate that Western cultures would struggle with implementations based on the differences (Van Landeghem, 2014). A mitigating factor for Western cultures is implementing the no lay-off policy and emphasis on RFP during Lean implementations. Toyota uses this approach within the United States and hospitals have followed which gives organizations the flexibility to move workers within the organization based on identified continuous improvements they have a voice in that benefit the organization (Balzer et al., 2019; Womack et al., 1990).

There is debate in other research that organizational culture with RFP is a more substantial key to implementation of Lean than national RFP culture due to the success of Japanese auto manufacturing plants in the United States (Lacetera & Syndor, 2015). There is limited other research that demonstrates the impact of RFP in Lean implementations. The limited research that currently exists has some differing findings, therefore, demonstrating the need for further study in with regards to RFP impact on Lean implementation.

Lean Implementation

Respecting people is a tenet of Lean management that can be overlooked in organizations due to the pressures of performance expectations. This can cause Lean implementations to fail when culture is abandoned. As an example, Bouville and Alis (2014) found that standardization, problem-solving, and job rotations can improve

productivity but can also have a negative relationship with employees. This could be attributed to the lack of respect for people and loss of autonomy. Another component of failed implementation is not recognizing the resources needed for success. Understanding the cultural foundation of the beginning of a Lean implementation is key. The ability of an organization to undergo a Lean implementation of scale is dependent on leadership and managers to commit themselves to the necessary Lean activities and sync them up with a proper rewards and recognition system (Netland, 2016). It is critical for the organization to be committed to the implementation as it has a meaningful impact on engagement with employees (Lesener et al., 2020).

Lean implementation research is largely focused on outcomes of the methodology such as waste reduction and process improvement (Roemeling et al. 2017). There is an opportunity to better understand what separates a successful implementation and sustainability from an unsuccessful attempt (Hopp, 2018). With literature focusing more on the structural aspects of Lean it is unclear what exactly leads to success and failures when Lean is reviewed in totality of structure and culture. The cultural context and experiences of organizations could be a factor in understanding this according to literature (Coetzee et al., 2019a). The nuances of how healthcare organizations implement Lean and the degree of how RFP is truly integrated within implementation and organizational culture can be explored in more detail.

Lean and Consulting

Many organizations turn to the consulting industry for training and implementing Lean. It is important to note the differences between implementing Lean through consulting and implementing Lean within an organization. Consulting provides

immediate subject matter expertise to assist in the training and structure of Lean. Consultants understand the need for soft Lean practices such as RFP and cultural nuances that assist with Lean implementation. However, Holmemo et al. (2018) found that the finite nature of a consulting engagement does not often include soft practices in Lean consulting. Therefore, it is important to understand what to expect from Lean consultants based on this research. In general, consulting engagements provide a plan or a road map but are not long enough to see the implementation all the way through completion. The subject matter expertise of a consultant develops the plan and then passes the plan to operational experts within the organization to implement. There is not an opportunity to fully train or implement the soft practices of Lean that take longer to establish due to their cultural impacts.

Lean and Strategy

Hallam et al. (2018) emphasized other impacts of Lean implementations are related to strategic and operational plans. Strategic criteria that provide specific operational direction have been shown to increase the success of Lean implementations by either lowering cost or increasing business within the organization. Multiple strategies are necessary for successful and sustaining Lean implementations. An example of this is annual goal setting from an organizational perspective. Lean implementation goals can be set based on the SMART goal setting criteria. Once established these goals can be cascaded to workers for there to be a goal alignment conversation. Goal setting has been found to assist in reaching organizational outcomes and can increase motivation of workers when set in a meaningful way (Latham, 2012). Hallam et al. (2018) further emphasized the strategy of human resources and RFP as indicators for success within

Lean. Additionally, Taylor et al. (2020) suggested that sustainability of the Lean implementation is impacted by emotional experiences that reveal how people feel about themselves, relationships with others is influential, and requires mental, physical, and emotional effort further indicating the importance of RFP and overall human element to Lean implementation.

Lean and Human Resources

Referring to the due no harm provision of psychology allows organizations to reflect on the strategies needed by performing a risk benefit analysis prior to moving forward with a Lean intervention. The industrial-organizational psychology skill set lends itself to debate the need for a Lean implementation based on the overall needs of the organization and the cultural climate that exists. Rauvola and Thomas (2019) found Lean implementations may not always have the best interests of employees in mind often focusing on outcomes rather than the Lean House described earlier leading to ethical considerations that leaders need to think through.

Lean organizations will need infrastructure in place that leadership can rely on to support the implementations and ongoing operations. Zirar et al. (2020) found Human Resources (HR) bundles that support EE and provide leaders with a plan to appropriately implement Lean. Work practices identified were a) HR planning; b) teamwork; c) employee participation. Employment practices identified were a) selective recruitment; b) performance appraisal; c) reward and recognition; d) extensive training. The aspects of Lean implementation that support the HR bundle are the continuous improvement process of daily huddling. Huddling solicits feedback from employees and provides a platform for them to create the PDCA cycle through idea generation. It promotes

teamwork through dynamic two-way conversations in the process. The extensive training a Lean organization will go through promotes the employment practices within the HR bundle. Lean training is a significant undertaking that is ongoing. While it takes investment in time, the fruits of that labor come out in EE and process improvement when all elements of Lean are implemented together.

While leaders need the infrastructure and planning to implement Lean, they also need to understand what values and behaviors are needed to be successful. Van Dun et al. (2017) conducted a mixed methods study identifying honesty, participation and teamwork, responsibility, candor, continuous improvement, and openness to change as the top values and behaviors of effective Lean managers. Success in leading Lean programs is based on leadership. Leadership combined with the values and behaviors identified in the study is how to be successful and sustaining with implementations.

Lean and Leadership

The impact of behaviors from leadership on team member behaviors is also important to understand in a Lean implementation. Van Dun et al. (2016) conducted a study that assessed team-leader values and team-members behaviors. The results of the study demonstrated that team-leader values were measured in two parts: self-transcendence (responsibility, integrity, customer focused, information sharing, honesty, teamwork, justice, open-heartedness, and altruism) and conservations (tradition, respect, and humility). The study found that team-leader self-transcendence values and team-member behaviors were positively related to Lean team effectiveness. However, team-leader conservation values were negatively associated with Lean team effectiveness. These findings are interesting considering that respect is a component of team-leader

conservation values leading to a contraindication of the value of respect with regards to Lean team effectiveness. This, however, is explained through Lean leaders having an emphasis on altruistic values and idea sharing within their teams' verses conservation-focused tradition and hierarchical values.

Other leadership paradigms support the need for leadership training that supports worker behaviors that drive work outcomes. Slemp et al. (2018) did a meta-analytical review based on the self-determination theory that demonstrated positive relationships with autonomy support that fosters basic need satisfaction, internalization of work motivation for workers, and positive work outcomes in workers. Autonomy support is a function of Lean implementation as it encourages the autonomy of worker idea generation that contributes to the continuous improvement of the daily workflow challenges that impact workers themselves creating a byproduct of worker engagement and satisfaction (Balzer et al., 2019).

Much of the literature reviewed regarding leadership was positive leadership. Negative leadership will also impact Lean implementations. While this is intuitive, there is literature reviewing in more detail the negative side of leadership. Greenbaum et al. (2015) conducted research that aimed at studying supervisor undermining behaviors and the perceptions of leader hypocrisy. The experimental study demonstrated that supervisor undermining and interpersonal justice expectations have a relationship that will predict perceptions of leader hypocrisy. The higher the degree of interpersonal justice expectations combined with supervisor undermining can also lead to higher turnover intentions. These results emphasize that leaders must be active participants in the process and not just expect workers to follow the practices without leader participation.

Types of leadership styles are also relevant with Lean implementations. Two leadership types that can be understood with Lean implantation are assigned leadership and emerging leadership. Northouse (2019) defined assigned leadership as a leader that is identified as the person in charge and is designated by the organization as such. Emerging leaders may not have formal titles or responsibilities but fulfill leadership responsibilities through their actions, competency, and respect of peers around them. Emerging leadership is related to the power types of referent power and expert power mentioned earlier while assigned leadership is related to the power bases of legitimate, reward, coercive, and informational. Leadership is important in Lean implementations as the RFP tenant of Lean encourages non-assigned leaders to contribute in meaningful ways to create the ideas that can contribute to the overall continuous improvement cycle (Balzer et al., 2019).

Lean and Healthcare

While strategy is a positive contributor to Lean, there are barriers to implementation and sustainability within healthcare spaces. Six underlying barriers were identified by Leite et al. (2020) in emergency healthcare settings: a) physician influence; b) the public health system impact on physician workflow in Brazil, the location of the study; c) public health system operational constraints; d) patient behavior in emergency areas; e) clinical staff behavior influences on Lean; f) resource management issues on staff. While these barriers are specific to The Brazilian public health system there are parallels that can be learned from within the United States. For example, the regulatory body for American healthcare is the Center for Medicare and Medicaid Services (CMS). Federman and Keyhani (2011) stated there are many regulatory constraints that also

inhibit operational practices that are counter to efficiencies gained from Lean. Physician workflow is also impacted by CMS as physicians are beholden to the regulatory expectations of federal rules.

Within American healthcare there are confounds such as staffing constraints due to the lack of supply of nurses based on the demand of nursing services that can be considered resource management issues. Leite et al. (2020) stated that physician influence can be a barrier when they are isolated from the operational practices and are performing their workflows independently of the Lean practices happening around them. If they are not engaged in the process, they can become a barrier not realizing their decision making occurring in their own workflows have negative downstream impacts to the Lean process the hospital staff are trying to implement. This can cause an opposing force that leads to barriers to a fully implemented Lean strategy. This can also be true of staff behavior and influences if their needs are not aligned with the Lean objectives. A component of Lean is the focus on the root cause of problems before implementing ideas to resolve. In healthcare the pace of the work environment coupled with staff that may not be engaged for confounding reasons can contribute to a lack of focus on the problem and they end up rushing to solutions that are not resolutions to a root cause. Patient behavior can also become a barrier in emergency areas. There are times that the socioeconomic conditions of the patient may influence their behavior. There are times when the clinical issue or outcome may influence the patient's behavior. In each of these situations the patient's behavior could be a contributing factor to atypical workflows being followed.

Radcliffe et al. (2020) demonstrated that when multidisciplinary staff were engaged, physicians and clinicians were early adopters, and strong interpersonal relationships existed the likely hood of a successful Lean implementation was higher in a United Kingdom radiology hospital setting. These findings reinforce the soft practices such as interpersonal relationships. A strategic Lean roadmap is another factor in Lean implementation and sustainability. A case study conducted by Silvério et al. (2020) identified that a Lean self-assessment approach will provide the organization with a strategy of what investments and improvements are necessary to increase success with Lean implementations. The roadmaps that can be created are important to understand based on the culture of the organization and can highlight the specifics of what is necessary to sustain Lean improvements. This is like the engagement of Lean consultants who provide subject matter expertise roadmaps to follow. However, the difference is the strategic roadmap generated internally would include all the soft practices typically absent from a consultant.

While there has been limited research into the effect of Lean on employee's feelings or behaviors there is some research aimed at how Lean in healthcare affects the psychosocial work environment. Ulhassan et al. (2014) studied the interaction between Lean and the psychosocial work environment finding Lean has a positive impact on the psychosocial work environment when properly implemented. The findings suggested that when employees are not participative, leadership is not engaged or present, and daily Lean work is not adhered to that psychosocial work also deteriorates. Conversely, improvements in the domains of `work organization and job content` (Lean work and employee participation) and `interpersonal relations and leadership` (leadership

engagement) were most relevant to successful Lean implementations (Ulhassan et al., 2014).

Lean Sustainability

Lean sustainability is often overlooked in literature with the focus on the implementation and short-term returns resulting from the interventions (Staedele et al. 2019). Staedele et al. (2019) revealed that only 3% of Lean literature reviewed studied the sustainability of Lean after implementation and none of the reviews had any metrics related to strategic planning. The study created an understanding of the gaps that exist within literature with performance evaluation of Lean implementations. There is an opportunity to not only do a retrospective review of the structural implementation but to include the soft practice reviews of what an organization can learn from a post Lean implementation review session. Soft Lean practices (SLP) and the effect of implementation could be considered job resources that mitigate job demands that can negatively impact employees.

Psychological Well-Being

Ryff (1989) developed the PWB model based on extensive literature reviews and previous works of metal health, clinical psychology, and life span theories. Ryff's theory identified six dimensions that represent PWB; a) self-acceptance; b) positive relations with others; c) autonomy; d) environmental mastery; e) purpose in life; f) personal growth (Dierendonck & Lam, 2022). Self-acceptance is when a person has a positive attitude about their self and qualities. Positive relations with others are represented by warm, satisfying, trusting relationships with those around. Autonomy is when a person has a sense of independence and self-determination. Environmental mastery is when a

person feels competent to handle the challenges that present throughout life. Purpose in life is when a person feels meaning and has direction in life. Personal growth is when a person feels their experiences are maturing and developing throughout life.

In a meta-analytical review of literature van Dierendonck and Lam (2022) demonstrated that psychological intervention programs can improve PWB based on Ryff's model. Specifically, targeted interventions can improve PWB with Ryff's model being a valid instrument to assess results of such interventions. The targeted interventions and techniques demonstrated the highest efficacy for improving PWB were cognitive behavior therapy and positive psychology combined with common elements across the interventions such as diary writing, homework with self-reflection, and self-awareness of cognitive and behavior patterns. Additionally, van Dierendonck and Lam (2022) noted a weakness in interventions of improving autonomy recognizing an opportunity for interventions to improve the feeling of empowerment and having choice.

Psychological Well-Being and Job Demands-Resources

Building upon the knowledge that targeted interventions can improve PWB connects with JDR. It is known from research by Lopez-Martin and Topa (2019) that an increase in job demands negatively impacts worker health and satisfaction while an increase in job resources positively correlates with worker health and well-being. Interestingly, the JDR model was expanded to include the role of organizational culture along with personal resources as predictors of employee satisfaction and well-being. This is an important concept to note because SLP's and RFP through Lean is culture building, and by association, can be linked to employee satisfaction and well-being through the JDR model. Organizational citizenship behaviors can improve with enhancement in focus

related to job satisfaction through organizational culture improvements. The expansion of the JDR model allows organizations to focus on interventions that are organization wide culture improvements in addition to individual resource needs based on organizational and individual demands.

Psychological Well-Being and Healthcare

Kim and Han (2019) studied what factors affect PWB of nurses in Japanese hospitals. Job rotation stress, perceived stress with changes within a job such as moving to a different department or task within the hospital, was the factor studied and how it affected PWB of nurses in a hospital. The results indicated a model showing nurses job rotation stress has an indirect effect on PWB through self-efficacy, social support, optimism, and coping strategies. Therefore, suggest that hospitals develop methods to promote PWB that may mitigate job rotation stress. This model fits within scope of studying how JDR can assess interventions such as Lean based on the cultural and personal resources provided through the Lean model.

Covid-19 has had an impact on the lives of healthcare workers since it began at the end of 2019 (Zhou et al, 2021). Psychology literature will begin to emerge in the coming years to understand the impact on workers. The implications of Covid-19 on the healthcare workforce altered the norms and day-to-day operations due to the disruptions of supply chain, shortages of staffing, and risk associated with working in this new environment; especially, early in the pandemic when not much information was known (Zhou et al, 2021). Aloweni et al. (2022) conducted a longitudinal study conducted in Singapore on the same participants in 2020, beginning of Covid, and 2021, during Covid, demonstrated that nurses felt less appreciated at work and if they felt their team was not

working well together were 3.30 times more likely to experience burnout. Overall, nurses experienced more burnout with reduced job dedication while reporting poor self-related health after the pandemic. Healthcare workers were faced with nuanced challenges that could potentially impact their perceived organizational support and PWB (Zhou et al., 2021). With the new pressures experienced within hospitals due to the pandemic there is a need for interventions at the departmental and organizational levels to support nurse PWB (Aloweni et al., 2022).

Employee Engagement

EE is one of the most studied workplace psychology attitudes (Sessa & Bowling, 2020). The link between EE and individual and organizational performance is important to understand for organizations. With empirical research in this space, organizations could set goals to help achieve success. A matter of goal setting that organizations can focus on are the strategic tactics to accomplish the goals.

Employee Engagement and Lean

There is not much known in literature of the impact of Lean on EE, therefore, Cullinane et al. (2017) aimed to understand how employees, in the context of using Lean, craft their jobs to improve their EE. Findings indicated that there is motivational potential for job crafting using Lean and employees were more engaged when they sought out resources and challenges in daily work activities. Job crafting was explored as it related to Lean but could be explored further on its direct relationship with EE. Jutengren et al. (2020) aimed to study concepts of work engagement and job satisfaction possibly promoting employee self-imposed behaviors through job crafting in a healthcare setting. Results demonstrated social capital has a positive relationship with both job satisfaction

and work engagement over time, however, evidence was not clear of job crafting having a mediating effect for social capital on work engagement and job satisfaction. While this study does not demonstrate a mediating effect of job crafting, there is still value in job crafting as it relates to Lean in addition to promoting social capital within workgroups in a healthcare setting.

Employee Engagement and Healthcare

Building upon this knowledge Dellve et al. (2018) aimed to assess EE with healthcare clinicians related to organizational redesign using Lean. Results demonstrate that engagement is linked to quality of care and patient safety while increased work resources are linked to EE in organizational improvements using Lean. These findings support that Lean practice is positively related to EE while also improving quality of care in a healthcare context and daily job activities (Cullinane et al., 2017; Dellve et al., 2018).

Employee Engagement and Covid-19

Ren et al. (2020) studied EE as an antecedent to job crafting and demonstrated how job crafting behaviors are related to innovation workplace behaviors and whether EE has a mediating effect on the relationships during Covid-19. This is a fresh look at attitude research as it relates to challenges in the work environment as it relates to Covid-19. Results demonstrate that employees' job crafting has a positive relationship with their satisfaction and innovation workplace behaviors with engagement being a mediator. These research findings are consistent with findings from Latham (2012) that demonstrate autonomy from employees increases their motivation. This is also consistent with Lean principles that idea generation through Lean methods promotes employee autonomy (Balzer et al., 2019).

Employee Engagement and Employee Commitment

Weer and Greenhaus (2020) were also interested in engagement as an antecedent to employee commitment with an organization. Their aim was to study the role of perceived organizational commitment, based on engagement and strong extra-role performance, and on managers' assessments of employees' career growth. Results indicate that extra-role performance and work engagement were antecedents to workplace commitment that had a positive relationship with perceived career growth opportunities.

Employee Engagement, Leadership, and Team Performance

Mariappanadar (2018) found leadership styles such as participative, supportive, and instrumental and dissonance factors have an impact on EE. Additionally, leadership styles such as perceived, preferred, and experienced predict EE while differentiated leadership styles have a stronger effect on EE and instrumental leadership with low level dissonance moderates EE. EE impact on team performance through exploring mediating effects of employee commitment and organizational citizenship behaviors was explored by Uddin et al. (2019). EE can improve team performance with EE being mediated by employee commitment and organizational citizenship behaviors. Understanding differing antecedents to EE and how it impacts behaviors is important for organizations to impact performance. Whether EE is a primary focus of research or an antecedent of other outcomes it is important for research to explore both aspects. EE from an attitude and behavior perspective was the focus of Uddin et al. (2019), however, resources that are needed for EE is another perspective that can be further studied.

Interestingly, research from Meleady and Craft (2017) found that imagined positive interactions with organizational leaders increases organizational identification

fostering increased motivation and performance. This is an important finding that supports interventions where visibility of leadership that enhances how employees perceive their leaders has a positive effect on how employees support organizational initiatives. Research conducted by Sung et al. (2017) additionally demonstrated that organizations that intentionally prepare employees for change increase organizational identification and attachment. They specifically studied this effect based on communications associated with a merger, the intervention of preparing employees for change is applicable in other workplace scenarios. As an example, if an organization can demonstrate the benefit of the company and the benefit to employees in the change that is proposed then employees have a more positive and supportive outlook on the change. This idea supports the work by Meleady and Craft (2017) on how the perception of leaders can also drive positive organizational identification and attachment.

Employee Engagement and Resource Theory

Resource theory was explored by Cooper-Thomas et al. (2018) to better understand the resources that are the most important for EE. Eight workplace resources predict EE: mission, vision, values; opportunities for development; supportive leadership; job resources; teamwork; learning and development; vision; and purpose. Learning and development and vision and purpose were the two resources that were the strongest predictors of EE out of the eight workplace resources. These findings are consistent with prior research that has a focus on Lean being the learning and development construct that could benefit EE.

Employee Engagement and Organizational Outcomes

Organizational outcomes and their relationship with EE were studied by Schneider et al. (2018). Engagement for an overall workforce can be an indicator of publicly traded companies' financial performance. Supervisory support and work attributes along with organizational practices have a significant positive relationship with workforce engagement. Financial metrics of return on assets (ROA) and net margin were shown to have a significant positive relationship with workforce engagement. Knowing this, it is important for organizations to identify practices that cultivate supportive relationships with employees with better financial performance being a byproduct of that effort.

Joplin et al. (2019) found employee entitlement can have an impact on engagement and performance. When ethical leadership is low entitled employees are less likely to experience higher engagement and more likely to experience lower job performance. When ethical leadership is high it mitigates entitlement and increases engagement. Therefore, it is of benefit for organizations to maintain high ethical leadership standards. There are other resources that can affect EE and PWB within the workplace. Spirituality has been shown to be a resource in multiple ways in the workplace and can fit within models previously discussed.

Job Demands-Resource Theory

Job demands-resources (JDR) theory was developed and introduced in literature by Demerouti et al. (2001) and is a psychological model that characterizes employee job characteristics into two categories: job demands and job resources (Bakke & Demerouti, 2016). Job demands are characteristics defined by sustained effort (workload) while job

resources are aspects of a job that help workers reach goals, reduce demands and costs, and improve personal growth and development (Tummers & Bakker, 2021). Personal resources such as self-efficacy and optimism are also included in JDR referring to employees' beliefs on how much control they may have on their work environment (Bakker & Demerouti, 2017).

Burnout can be linked to job demands within the JDR construct. From a workplace perspective, burnout can be defined as a work-related syndrome coupled with chronic exhaustion, cynicism, and reduced professional efficacy (a feeling of reduced competence and success at work; Bakker & de Vries, 2020). Effects of high workloads on job demands can lead workers to experience burnout while increased in job resources can increase motivation leading to more worker engagement (Tummers & Bakker, 2021). This demonstrates that job demands and resources can interact with one another. For example, when a worker has more autonomy (job resource) an adverse effect of higher workload (job demand) can be managed (Dicke et al., 2018). Additionally, a worker can proactively manage job resources by seeking resources such as feedback from a manager that increases worker motivation and sets them on a positive self-reinforcing pathway (Van Wingerden et al., 2017).

Job Demands-Resources and Lean

Defining resources that can improve the effects of demands is key to identifying practices that can support workers. Beraldin et al. (2019) described Lean as a continuous improvement system that fulfills the resources aspect of JDR. Lean implementations with JDR are a natural fit. Research has demonstrated that SLP's such as management support, employee participation, small group participation such as huddles, top management

leadership for Lean, coaching of Lean, and solicitation of employee ideas serve as job resources and can act as a motivational mechanism. Job demands that can hinder well-being from a Lean perspective are implementations that are only focused on hard practices such as just in time (JIT) training that create physical or mental effort such as work pace when SLP's are absent. Researchers concluded that Lean implementations using SLP's increase engagement and well-being while reducing the effect of hard practice job demands on exhaustion.

Additional research has shown that RFP principles (teamwork, develop and challenge people, motivation, train problem-solvers, safety, removing waste, and display people's capabilities) provide a framework that can balance the technical practices of Lean to the human side of Lean with SLP's (Coetzee et al., 2019b). This is important to understand based on JDR research on job burnout that demonstrates when people experience increased job strain (job demands) they are likely to use maladaptive self-regulation and not focus on job stress recovery or job crafting (Bakker & de Vries, 2021). Stable resources are necessary to counter the job demands that help employees recognize and regulate their sense of burnout and fatigue.

Contrasting Theories

JDR was the theoretical foundation that supported the research model proposed for studying the maturity of Lean effect on nurses PWB and EE in a hospital setting. Multiple theories were explored to determine the appropriate fit for continued research with Lean in a healthcare setting. It was important to determine a theoretical basis that addressed the needs of employees while studying the Lean effect.

Self-Determination Theory (SDT)

Böttcher and Friehs (2022) described SDT as mechanisms underlying behavior exploring how, when, and why people experience intrinsic motivation. SDT began with early mini theories such as cognitive evaluation theory by Deci and Ryan in1980 focusing solely on intrinsic drivers of behavior and motivation. At the core of SDT is that behavior is self-determined based on autonomy instead of external forces. Therefore, SDT was ruled out based on a narrow study of intrinsic drivers of motivation rather than an external resource such as Lean that may foster motivation and autonomy.

Person-Job Fit Theory (PJF)

Holland introduced the foundation leading to PJF in his theory of vocational choice and has been widely cited since 1953 (Hartmann et al., 2021). Huang et al. (2019) described PJF as an alignment between the individual and the job based on the knowledge and skills of the individual and job requirements. There is a relationship between positive work engagement and performance based on a successful person-job match. The need for a person-job match based on knowledge and skills was ruled PJF out as a theoretical foundation. Lean is a resource that develops knowledge and skills using SLP's and technical tools capturing all employee ideas (Bortolotti et al., 2015). There could be an argument that PJF can be studied further with Lean implementation when a person-job match is already in place and a Lean implementation is conducted.

Biblical Foundations of the Study

Spirituality at Work

Research demonstrates that 58% of practicing Christians somewhat or strongly agree learning from their faith community helps with success at work (Howard et al., 2020). Additionally, a Christian perspective within the work environment connects the value of work within God's creation and design (Howard et al., 2020; McGhee, 2019). Through the concept of spiritual models at work, a foundation for how to achieve cultural improvements focusing on the person being at the center of the organizational focus is a research opportunity (Porras & Toro-Jaramillo, 2020). An example in a hospital setting is chaplaincy models are common as the job resource to spiritual needs for employees, patients, and customers to support their well-being (Riggs, 2020). Spirituality, through hospital chaplains, is used in healthcare to assist hospital personnel in managing the difficult work situations that can be encountered (Achour et al., 2019; Riggs, 2020). Understanding that spirituality can be a resource for employees of an organization can be a meaningful endeavor (Howard et al., 2020) on their PWB and engagement.

Workplace Spiritual Theories and Job Demands-Resources

Generally, spirituality is significantly related to PWB indicating the need to develop programs focused on maintaining and improving dimensions of health and well-being through spirituality (Bożek et al., 2020). Spirituality at work is linked to positive nurse retention and PWB. Birnie (2019) found that spiritual leaders increase nurse retention and increase nurse PWB when their leadership includes visions and cultures based on altruistic love. This is based on Fry's (2003) spiritual leadership theory (SLT). SLT's goal is to meet the spiritual needs of leaders and followers creating spiritual well-

being that develops into a calling and membership for the leader and follower (Birnie, 2019). SLT fits within JDR as an overall resource that could be included within a Lean implementation addressing the human needs within SLP's.

Biblical Perspective

From a biblical perspective, God values work, and His design is for people to work as part of how God is honored. Colossians 3:23 (*English Standard Version*, 2001) says, "Whatever you do, work heartily, as for the Lord and not for men". II Thessalonians 3:10 states, "For even when we were with you, we would give you this command: If anyone is not willing to work, let him not eat". This biblical design provides man the knowledge and competencies developed through research that please God's intention at work.

It is important to understand that the fall of man, as illustrated by Wolters (2005), distorted creation. Sin, however, did not distort God's design. God's design is weaved through all of creation including natural law and psychological knowledge. John 1:3 states, "All things were made through him, and without him was not anything made that was made" (*English Standard Version*, 2001). As we better understand this it can be concluded that knowledge gained through contemporary psychology is a gift from God and part of His creation. Man must not forget about creation and all that God did to recreate the universe through the redemption of Jesus Christ and his sacrifice for our sins (Wolters, 2005, p. 14). God loves His creation. It is within His infinite power to start the universe all over again if He chooses. However, through His love, He sent his only son to be sacrificed for our sins to re-create the universe. Through Jesus we have a pathway to salvation and God. Through Jesus the promise of a new kingdom is coming.

Summary

This research proposal will address gaps in existing literature such as the differences a Lean implementation has on nursing behaviors and attitudes through an industrial organizational psychology lens. The opportunity to link Lean to workplace behaviors and attitudes can be important in Lean research with developing tactics and models for nursing support of continuous improvement. There is a weakness in Lean research as it is not well represented with regards to these behaviors or attitudes in industrial organizational psychology literature (O'Brien & Forman, 2019; Rauvola & Thomas, 2019). When implemented with true RFP, Lean can be a successful tool (Coetzee et al., 2019b). From a leadership perspective a productive way to understand the value of Lean is to focus on the cultural aspect and leadership values of Lean implementation (Van Dun et al., 2016). If the value proposition of Lean implementation is financially driven, has lack of leadership support, and employees are not resourced appropriately then it is likely that any improvements that may occur will have an adverse impact on EE based on prior research about Lean interventions that are unsuccessful (Leite et al., 2020).

Biblically, God has a design for how to please Him through our work (McGhee, 2019). A formula that brings faith into the workplace creating a more successful work environment has been shown to work in literature (Howard et al., 2020). Arguably, resources provided to employees in the form of spiritual tools, models, and support fit within the JDR model linking a biblical foundation with contemporary psychological models (Miner & Bickerton, 2020).

Other research implications are to understand the generalizability among nurses within a hospital setting based on their job demands and resources within the construct of the JDR model. What is learned from this study can further develop techniques used in hospitals that impact PWB and EE through Lean continuous improvement methodology. Other segments of healthcare could benefit from such research causing continued research to evolve.

Additionally, this study proposal has practical implications in healthcare. With ever changing operations related to regulatory pressures, reimbursement changes, and most recently, the Covid-19 pandemic, healthcare needs a model that can be supportive to the organization and employees. While the origins of Lean may have started in manufacturing, the evolution of the practices can be further adapted and studied to be successful in healthcare (Nicholas, 2023).

Next, a review of the research question and hypotheses will be conducted followed by the research design. The participants and power analysis will be outlined with the study procedures. The survey instruments will be introduced with validity and reliability data followed by the data analysis that will be conducted. Finally, the delimitations, assumptions, and limitations will be reviewed.

CHAPTER 3: RESEARCH METHOD

Overview

In Chapter 3, a restatement of the research question and hypothesis will be followed by a description and illustration of the research design. Participants will be defined, and a power analysis will be shown indicating the minimum sample size for the study. Study procedures will be detailed and demonstrate how participants will be recruited, consented, and the process for how participants will complete survey instruments. The survey instruments will be identified in detail followed by an operational definition of the variables. The type of statistical testing used for data analysis will be described. The chapter concludes with delimitations, assumptions, and limitations of the study.

Research Question and Hypotheses

Research Question

RQ1: Is there a difference between Lean maturity, psychological well-being, and employee engagement among registered nurses in a hospital setting at three levels: a) a hospital in a health system where Lean is implemented throughout the system, b) a hospital that has implemented Lean in a health system that has not implemented Lean, c) a hospital that has not implemented Lean in a health system that has not implemented Lean?

Hypotheses

Hypothesis 1_0: There is not a difference with a Lean implementation in a hospital setting at three levels: a) a hospital in a health system where Lean is implemented throughout the system, b) a hospital that has implemented Lean in a health system

that has not implemented Lean, c) a hospital that has not implemented Lean in a health system that has not implemented Lean between Lean maturity, psychological well-being, and employee engagement among registered nurses.

Hypothesis 1_a: There is a difference with a Lean implementation in a hospital setting at three levels: a) a hospital in a health system where Lean is implemented throughout the system, b) a hospital that has implemented Lean in a health system that has not implemented Lean, c) a hospital that has not implemented Lean in a health system that has not implemented Lean between Lean maturity, psychological well-being, and employee engagement among registered nurses.

Research Design

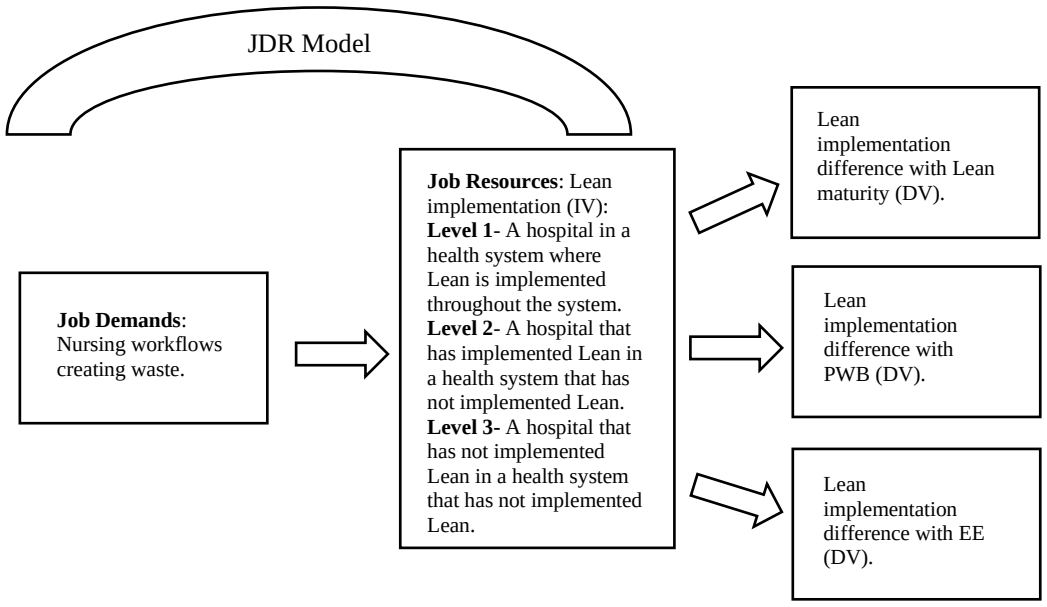
Utilizing the JDR model the differences between LM, PWB, and EE on nurses within a hospital setting will be studied as indicated in Figure 3. This quantitative quasi-experimental design will assess Lean implementation at three levels; a) a hospital that has implemented Lean in a health system that has not implemented Lean, b) a hospital in a health system where Lean is implemented throughout the system, c) a hospital that has not implemented Lean in a health system that has not implemented Lean. There will be three self-administered survey instruments that will be completed by volunteer participants. The survey instruments that will be administered are Lean Healthcare Implementation Self-Assessment Instrument (LHISI-25), the short form of the Psychological Well-Being Scale (PWBS-18), and the short form Utrecht Work Engagement Scale (UWES-9).

Self-administered survey instruments were selected to increase the likelihood of participation of the participants. The LHISI is an accepted validated survey used in Lean

healthcare research (Reponen et al., 2021). The PWBS (Ryff & Keyes, 1995) and UWES (Schaufeli et al., 2006) are accepted validated surveys within psychology. The study design will collect self-assessed data on the maturity of Lean implementation, PWB, and EE among nurses at the three levels of Lean implementation.

Figure 3

Study Design



Participants

Participants were asked to volunteer from the following hospital settings: a) a hospital in a health system where Lean is implemented throughout the system, b) a hospital that has implemented Lean in a health system that has not implemented Lean, c) a hospital that has not implemented Lean in a health system that has not implemented Lean. Participant selection was conducted by the lead researcher working with nursing research departments at participating hospitals to select all RN's at identified hospitals. All potential participants were from a nursing division working in a variety of nursing departments. The participants were registered nurses (RN). Potential participants were

asked to volunteer for this quantitative study and must be over the age of 18 years. Permissions for recruitment from Atrium Health Wake Forest Baptist and Intermountain Health were obtained from each healthcare companies nursing research leadership and are included in Appendix A.

A priori power analysis was conducted using G * Power 3.1 (Faul et al., 2007). A MANOVA global effects with an alpha of $\alpha = .05$ and effect size of $f^2 = .0625$ was selected based on lack of previous research. As research matures a stricter alpha and larger effect size may be used. The results demonstrated that $\alpha = .05$, $f^2 = .0625$, power = .80, number of groups (levels of IV) = 3, and response variables (DVs) = 3 yields a total sample size of 114, found in Appendix B. This allowed for a sampling of 38 participants in each group. Random sampling was conducted sending 500 recruiting emails at each hospital totaling 1,500 recruiting emails. A total sample size of 117 was collected to ensure a statistical power of $\geq .80$.

Study Procedures

Recruitment of Participants

Potential participants were from a variety of nursing departments such as inpatient medical, inpatient surgical, inpatient critical care, emergency department, or operating room environments. A message to encourage participation was the opportunity for nurses to share their voice to improve patient care. Additionally, participation allowed for advances in research within nursing well-being and engagement.

Recruitment Email Procedure

A recruitment email, found in Appendix C, was sent to nurses inviting them to participate in a hospital in a health system where Lean is implemented throughout the system. A recruitment email, found in Appendix D, was sent to nurses inviting them to participate from a hospital that has implemented Lean in a health system that has not implemented Lean. A recruitment email, found in Appendix E, was sent to nurses inviting them to participate from a hospital that has not implemented Lean in a health system that has not implemented Lean. Potential participants were invited to volunteer for the study.

Process of Participants Completing Instruments

Within the recruitment email potential participants were notified that if they volunteer to participate there will be three surveys embedded within the email that leads them to the LHISI-25, PWBS-18, and UWES-9. The link will first lead the participant to an information sheet, available in Appendix F, page. After review, the participants participated in the surveys. The surveys were conducted through REDCap, a web-based survey application. The results of the three survey instruments were then exported from REDCap in a file that was uploaded to IBM SPSS V.29 for statistical analysis.

Instrumentation and Measurement

Lean Healthcare Implementation Self-Assessment Instrument (LHISI-25)

According to Reponen et al. (2021), the LHISI is a self-administered survey instrument designed to allow healthcare organizations to self-monitor progress of Lean implementation. With an assessment of LM in a healthcare organization, leadership has actionable knowledge on how to advance Lean practice. The LHISI-25 permissions for use and short form, found in Appendix G, was reduced from the original form of 43 items to a 25 item Likert (0 – 8 scale, 0 = Never, 4 = Sometimes, 8 = Always) survey.

Reliability and Validity LHISI-25

Reponen et al. (2021) found Cronbach alphas for the LHISI-25 leadership domain consisted of 10 items (α = .948), the commitment domain consisted of 5 items (α = .932), the standard work domain consisted of 4 items (α = .922), the communication domain consisted of 3 items (α = .87), and the daily management system domain consisted of 3 items (α = .825). A 5-factor confirmatory factor analysis (CFA) model demonstrated comparative fit index (CFI = .921), root mean square error of approximation (RMSEA = .068), and standardized root mean square residual (SRMR =.05).

Psychological Well-Being Scale (PWBS-18)

Ryff and Keyes (1995) developed a short form of the original PWBS. Similarly, a Mandarin PWBS short form was also developed specifically for nurses because of the need for an easy to take survey based on limited time of nurses while also demonstrating better reliability and validity (Lee et al., 2019). The PWBS-18, available for public use at sparqtools.org, found in Appendix H, was reduced to an 18 item Likert (1 = strongly agree; 2 = somewhat agree; 3 = a little agree; 4 = neither agree or disagree; 5 = a little

disagree; 6 = somewhat disagree; 7 = strongly disagree.) survey that should take 3 – 5 minutes to take.

Reliability and Validity PWBS-18

Lee et al. (2019). found an overall Cronbach alpha for the PWBS-18 short form to be α = .88. A revised model of Confirmatory factor analysis (CFA) model demonstrated comparative fit index (CFI = .90), root mean square error of approximation (RMSEA = .076), and standardized root mean square residual (SRMR =.048).

Utrecht Work Engagement Scale (UWES-9)

Schaufeli et al. (2006) collected data from ten different countries to develop a short form for the UWES. The UWES-9 is a self-administered survey instrument that has an inverse association with burnout. Therefore, it is an acceptable psychometric to assess work engagement with studies on positive organization behavior. The UWES-9 permissions for use and short form, found in Appendix I, was reduced from the original form of 17 items to a 9 item Likert (0 – 6 scale, 0 = almost never, a few times a year or less; 2 = rarely, once a month or less; 3 = sometimes, a few times a month; 4 = often, once a week; 5 = very often, a few times a week; 6 = always, every day) survey.

Reliability and Validity UWES-9

Schaufeli et al. (2006) found Cronbach alphas for the UWES-9 short form for the vigor domain consisted of 3 items (α = .77), the dedication domain consisted of 3 items (α = .85), the absorption domain consisted of 3 items (α = .78).

After multiple-group modeling was conducted a three-factor model was determined to be the greatest fit for the domains with GFI = .95, AGFI = .90, RMSEA = .03, normed fix index (NFI) = .95, nonnormed fit index (NNFI) = .93, and CFI = .96.

Operationalization of Variables

Lean Implementation – Lean implementation is a categorical independent variable (IV) that will be measured at three levels: a) a hospital that has implemented Lean in a health system that has not implemented Lean, b) a hospital in a health system where Lean is implemented throughout the system, and c) a hospital that has not implemented Lean in a health system that has not implemented Lean.

Maturity of Lean – Maturity of Lean is the degree of Lean implementation within the domains of leadership, commitment, standard work, communication, and daily management system defined by nurses in a hospital setting. Maturity of Lean is an ordinal dependent variable (DV). The LHISI-25 will measure mean score in total and between domains with higher scores being associated with higher maturity of Lean (Reponen et al., 2021).

Psychological Well-Being – PWB is a mental state that encompasses 6 dimensions of wellness; a) self-acceptance, b) environmental mastery, c) positive relations, d) purpose of life, e) personal growth, and f) autonomy. PWB is an ordinal dependent variable (DV). Ryff and Keyes (1995) indicated the PWBS-18 measures subscale scores for each participant, sum respondents' answers to each subscale's items. Higher scores mean higher levels of psychological well-being. Subscale domains will not be measured if respondents answer less than half of the items. There are questions that will be reversed scored: Q1, Q2, Q3, Q8, Q9, Q11, Q12, Q13, Q17, and Q18. The following is the formula for reverse-scoring: (Number of scale points) + 1) - (Respondent's answer). For example, Q1 is a 7-point scale. If a respondent answered 3 on Q1, you would re-code their answer as: (7 + 1) - 3 = 5.

Employee Engagement – EE is defined as how often employees experience, in their work, a defined feeling or attitude linked to three factors (vigor, dedication, and absorption). EE is an ordinal dependent variable (DV). The UWES-9 will measure mean score in total and between domains with higher scores being associated with higher engagement (Schaufeli et al., 2006).

Data Analysis

A Kruskal-Wallis test was used for data analysis. This non-parametric test was selected based on violations of assumptions to parametric testing and was conducted using IBM SPSS V.29. This statistical test was selected based upon the study containing one independent variable (maturity of Lean implementation) containing 3 levels: a) a hospital in a health system where Lean is implemented throughout the system, b) a hospital that has implemented Lean in a health system that has not implemented Lean, c) a hospital that has not implemented Lean in a health system that has not implemented Lean) with three ordinal dependent variables (LM, PWB, and EE).

Delimitations, Assumptions, and Limitations

Delimitations

The study conditions selected are hospitals and the participants are registered nurses. Understanding techniques that may support nurse burnout with associated measures such as PWB is an important factor in nursing research (Lee et al., 2019). The three levels of the IV are boundaries set to enrich the data collection of Lean implementations. One level will be a hospital in a health system where Lean is implemented throughout the system. The second level will be a hospital that has implemented Lean in a health system that has not implemented Lean. The third level will

be a hospital that has not implemented Lean in a health system that has not implemented Lean. Additional delimitations are that the short form for all survey instruments was selected. The reason for this is to allow for more participation among nurses who have work schedules.

Assumptions

Potential participants will answer survey instruments truthfully and honestly and understand the questions they are being asked. Additionally, potential participants will have the time to complete the survey instruments. The researcher will provide clear instructions to potential participants on how to score the survey instruments. Potential participants will understand that they may withdraw from the study at any point in time.

Limitations

Limitations such as response bias of participants filling out survey instruments based on social desirability (Keough & Tanabe, 2011) to measure maturity of Lean implementation, PWB, and EE appeared to occur. Another bias that may limit the study is conformity bias with self-assessment instruments being used (Peters, 2022). Generalizability is limited to a population that is composed of majority females within nursing (Shah et al., 2021) compared to an overall workplace population (Degtiar & Rose, 2023). Participants may not have been allowed enough time to complete data collection yielding lower participation. The participation should take 20-25 minutes to complete; 10 minutes for the LHISI-25 (Reponen et al.,2021), 5 minutes for the PWBS-18 (Ryff & Keyes, 1995), and 5-10 minutes for the UWES-9 (Schaufeli et al., 2006).

Summary

The research design of the study was detailed after a review of the research question and hypotheses. The alternate hypothesis that will be tested is if there is a difference between maturity of Lean, psychological well-being, and employee engagement among registered nurses in a hospital setting at three levels: a) a hospital in a health system where Lean is implemented throughout the system, b) a hospital that has implemented Lean in a health system that has not implemented Lean, c) a hospital that has not implemented Lean in a health system that has not implemented Lean. The process by which the potential participants will be identified, recruited, and contacted was outlined. Participants from each hospital took the three self-administered surveys to measure their perceptions of LM, PWB, and EE.

The LHISI-25 survey was administered to assess a hospital's LM (Reponen et al., 2021). The PWBS-18 was administered to assess PWB (Ryff and Keyes, 1995). Finally, the UWES-9 was administered to define EE (Schaufeli et al., 2006).

Delimitations such as utilizing the short forms of the survey instruments were noted to increase study participation. Assumptions such as participants having the time to take the survey instruments was discussed followed by the clarity that participation in the study is voluntary. Social desirability (Keough & Tanabe, 2011) and confirmatory bias (Peters, 2022) were addressed as limitations within the study parameters of the potential participants.

Next, an overview of the data collection and research questions will be conducted. The descriptive statistics of the study will be presented with the relevant means to the

survey instruments. Finally, the study findings will be presented with relevant statistics and tables.

CHAPTER 4: RESULTS

Overview

This quantitative study examined the differences of Lean implementation in three settings; (a hospital in a health system where Lean is implemented throughout the system [Hospital 1], a hospital that has implemented Lean in a health system that has not implemented Lean [Hospital 2], a hospital that has not implemented Lean in a health system that has not implemented Lean [Hospital 3]) between LM, PWB, and EE among nurses in a hospital setting. Data was collected from nurses at three levels of hospitals over a three-month period. Three survey instruments (Lean Healthcare Implementation Self-Assessment Survey, Utrecht Work Engagement Scale, and Psychological Well-Being Scale) were emailed to a random sample of 500 nurses at each hospital. Weekly reminder emails were sent until there were enough participants. A total of 118 nurses participated in the study out of 1,500 participant emails sent for a participation rate of .79%.

Descriptive Results

The total number of participants for the survey were 118. One participant was excluded for not filling out one of the three surveys leaving a total of 117 participants. Participants were registered nurses in a hospital setting. Demographic statistics are presented in Table 1. Bar graphs demonstrate the demographic frequency of participants for Primary Work Unit (Figure 4), Primary Job Responsibility (Figure 5), Years Worked in Organization (Figure 6), Primary Work Setting (Figure 7), Primary Work Shift (Figure

8), Gender (Figure 9) and Race (Figure 10). Descriptive statistics for the dependent variables are disaggregated by the independent variable in Table 2.

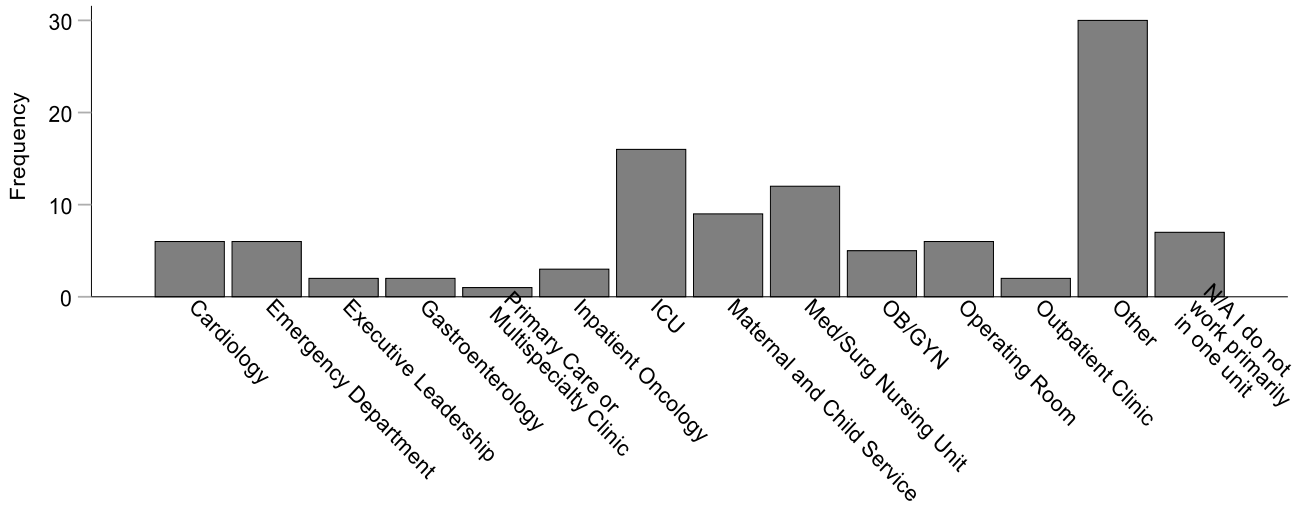
Table 1

Demographic Statistics

	Primary Work Unit	Primary Job Responsibility	Years Worked in Your Organization	Primary Work Setting	Primary Work Shift	Gender	Race
N	107	117	116	115	116	117	117
Mean	18.31	2.91	12.56	1.15	2.18	1.94	2.88
Std. Deviation	8.60	.65	9.73	.36	1.37	.27	.80

Figure 4

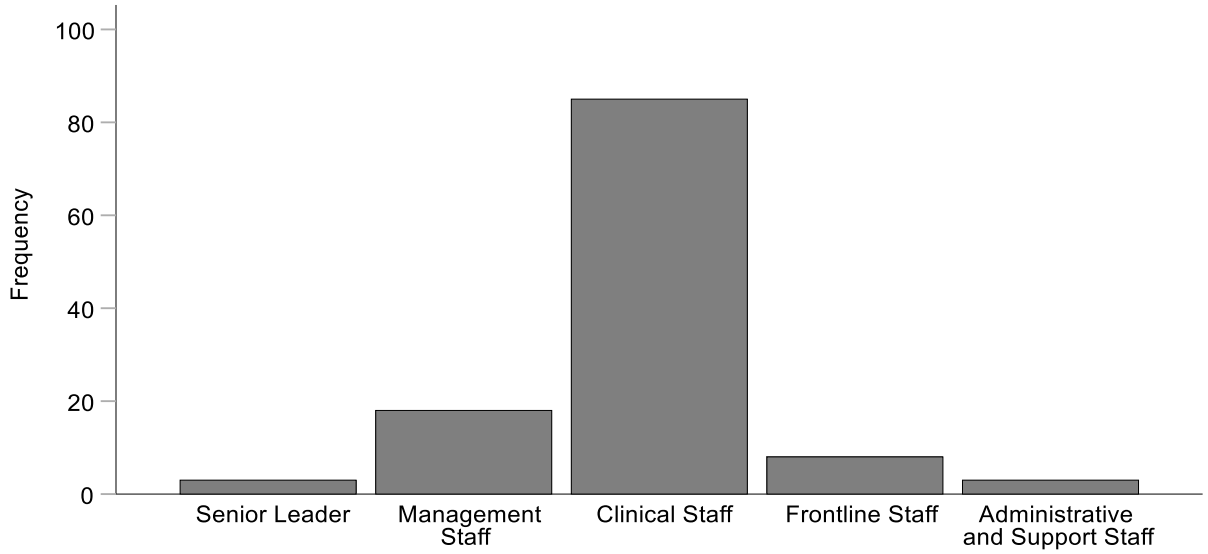
Primary Work Unit



Note. N = 107.

Figure 5

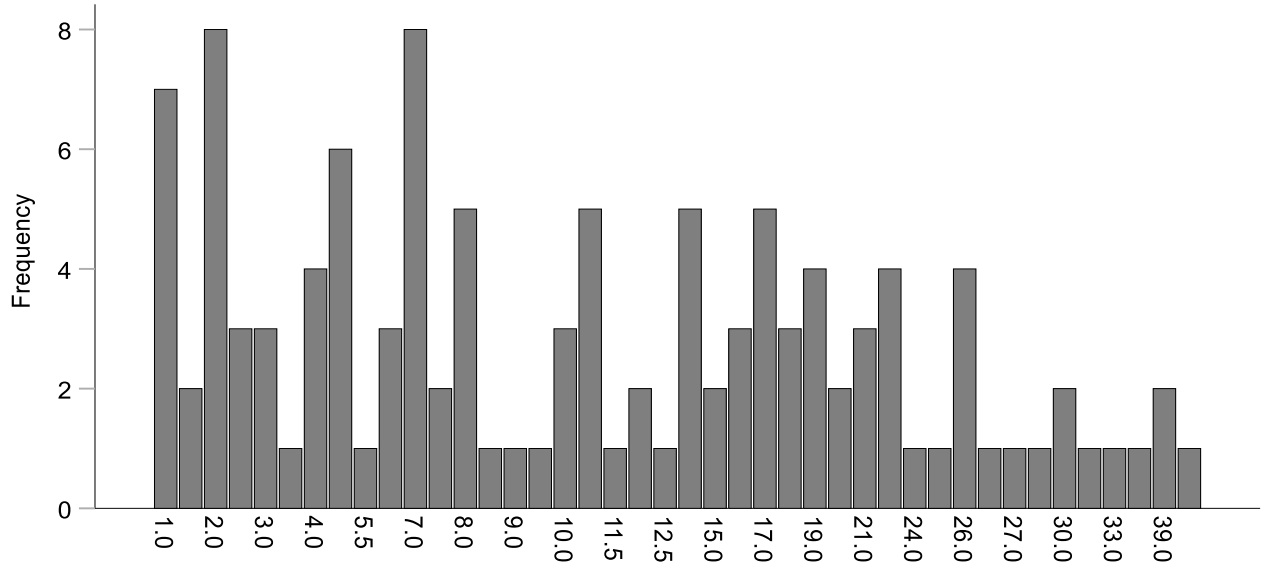
Primary Job Responsibility



Note. N = 117.

Figure 6

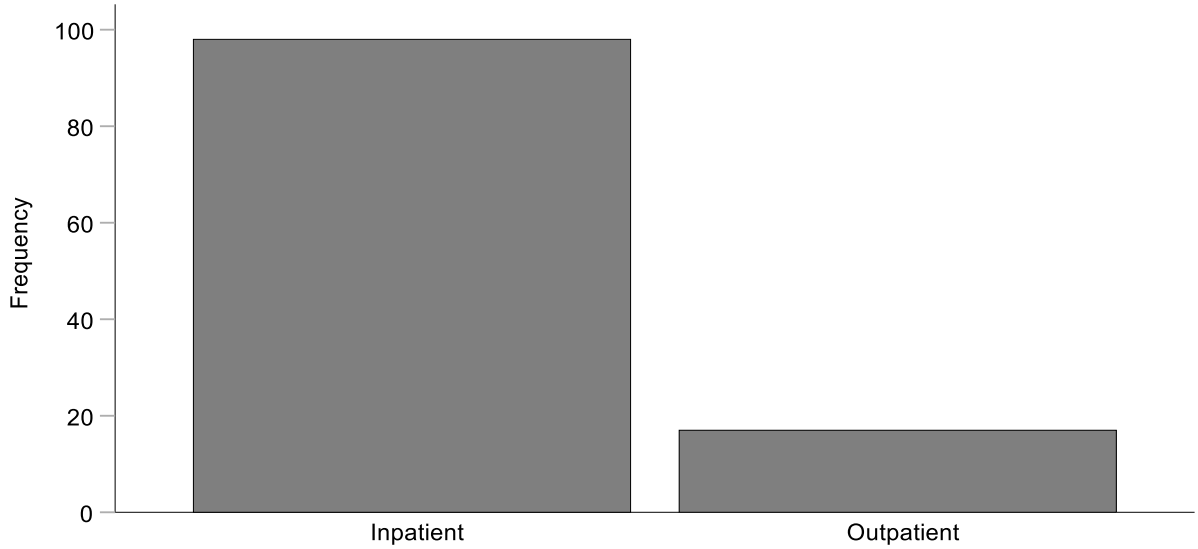
Years Worked in Your Organization



Note. N = 116.

Figure 7

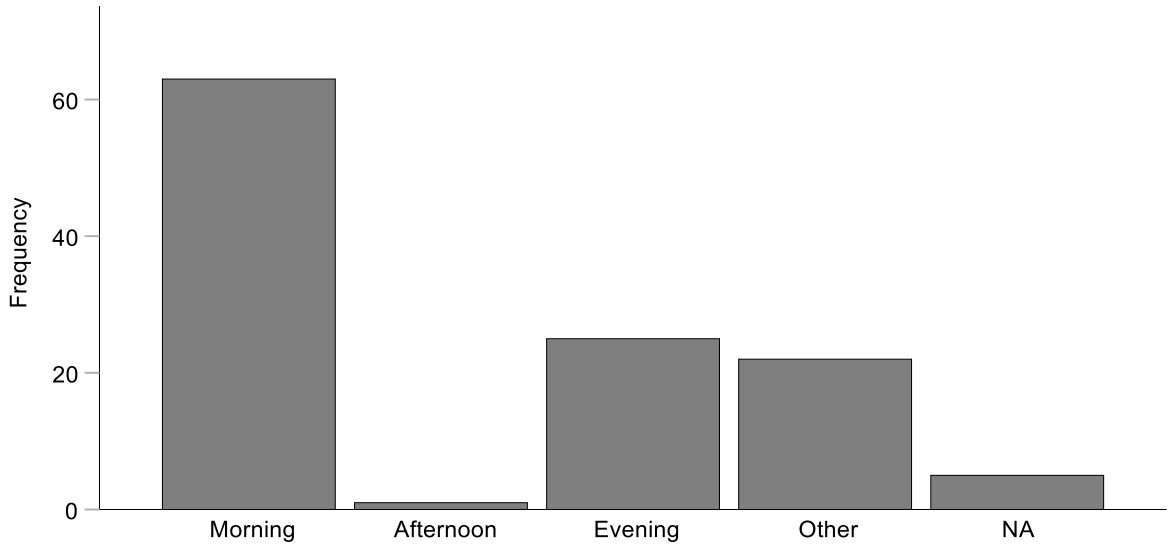
Primary Work Setting



Note. N = 115.

Figure 8

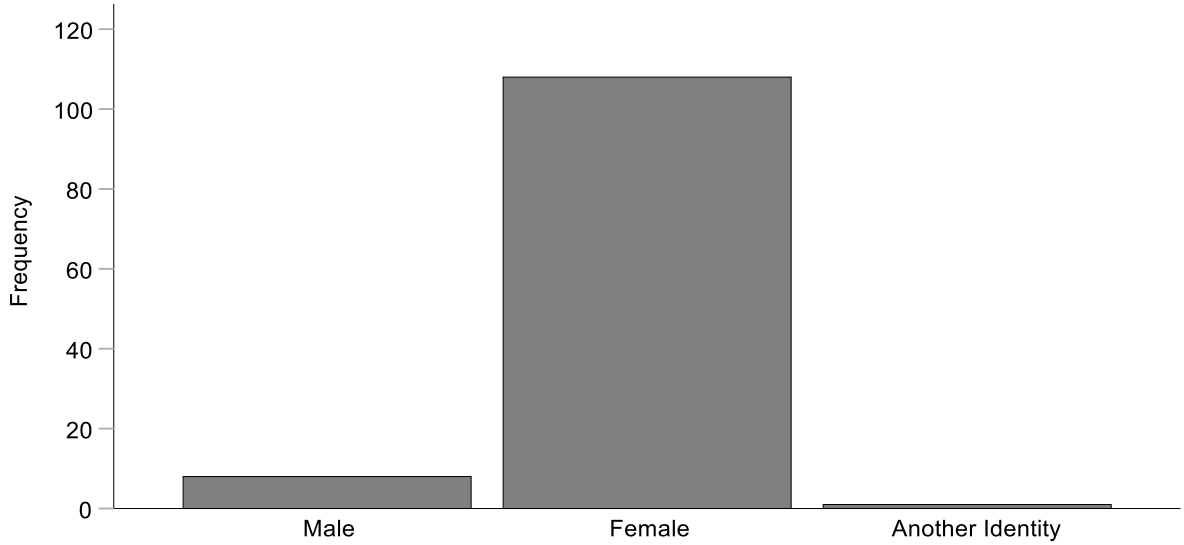
Primary Work Shift



Note. N = 116.

Figure 9

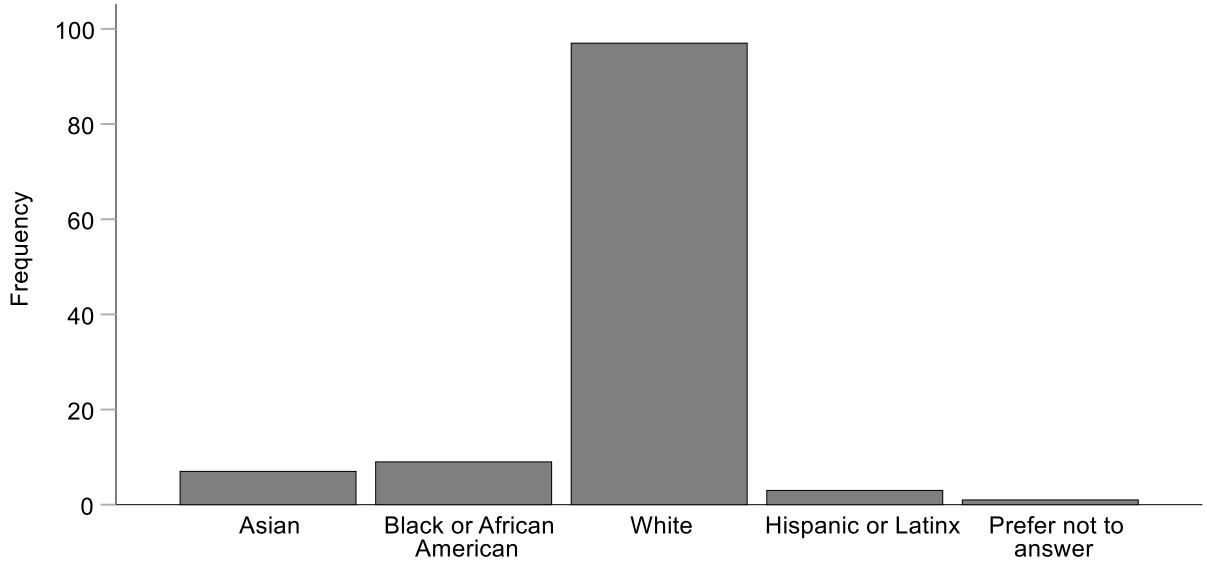
Gender



Note. N = 117.

Figure 10

Race



Note. N = 117.

Table 2

Descriptive Statistics of Dependent Variables

	N	Mean	Std. Deviation
Lean Maturity	117	5.76	1.35
Employee Engagement	117	4.20	1.02
Psychological Well-Being	117	100.81	13.15

Study Findings

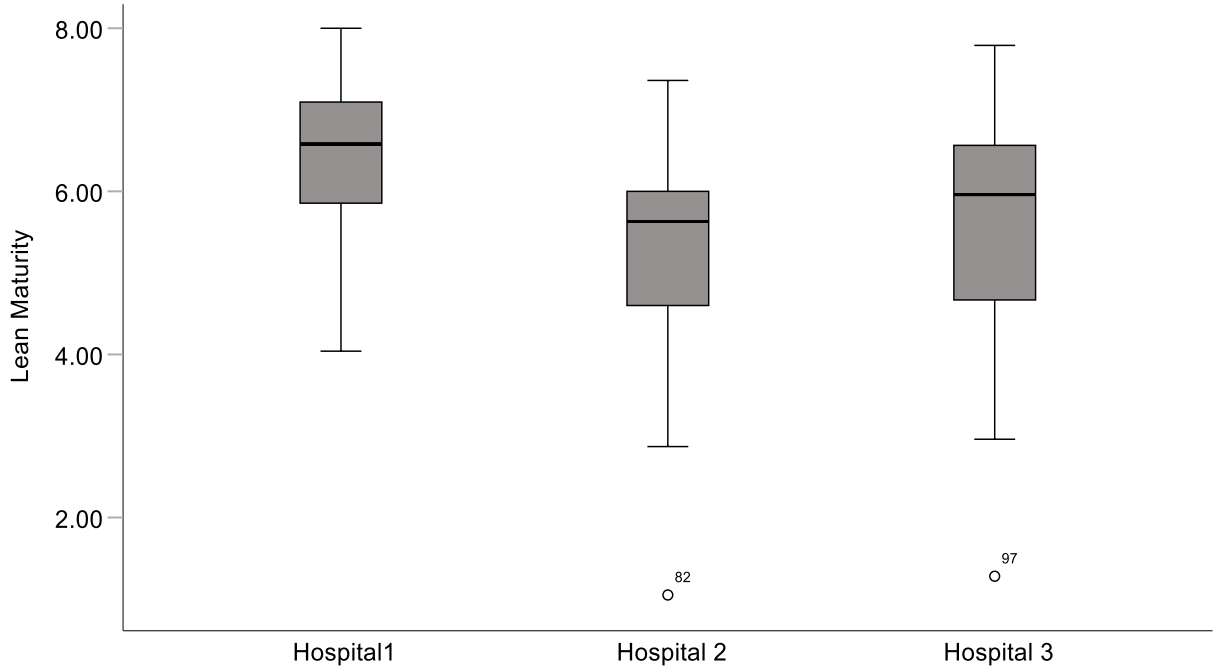
Statistical analysis was conducted to investigate if there were significant differences between LM, PWB, and EE among registered nurses in a hospital setting at three levels: Hospital 1, Hospital 2, and Hospital 3. Based on Ntumi (2021), the following criteria should be met for the parametric testing analysis: a) data collected will be randomly sampled from participants; b) there will be a categorical IV with two levels at least two interval DV's; c) the DV's will be multivariate and normally distributed within each level of the IV; d) the population covariance matrices for each IV level will be equal to maintain homogeneity. To ensure assumptions are met the sample size between IV levels will be balanced as much as possible. Any outliers or influential data points will be removed to maintain homogeneity.

Assumption testing was assessed by examining the boxplots of the three dependent variables (see Figures 11, 12, 13). There were some outliers identified, however, no extreme univariate outliers identified. The Shapiro-Wilks test revealed that three levels of the independent variable for the three dependent variables indicated assumption of normality is violated ($p > .05$) for Hospital 1 LM, Hospital 3 LM, Hospital 1 EE, Hospital 2 PWB, and Hospital 3 PWB (see Table 3). Linearity assumptions are violated based on inspection of scatter plots (see Figure 14). The association between the

LM and PWB was not significant, r (115) = .14, p = .13 (see Table 4) indicating a violation of singularity. Based on these violations of assumptions, data transformations were conducted using four techniques (square root, log, inverse, and squared). Each technique revealed the same assumption violations discovered with the raw data. Therefore, it was determined non-parametric testing was needed to complete statistical analysis.

Figure 11

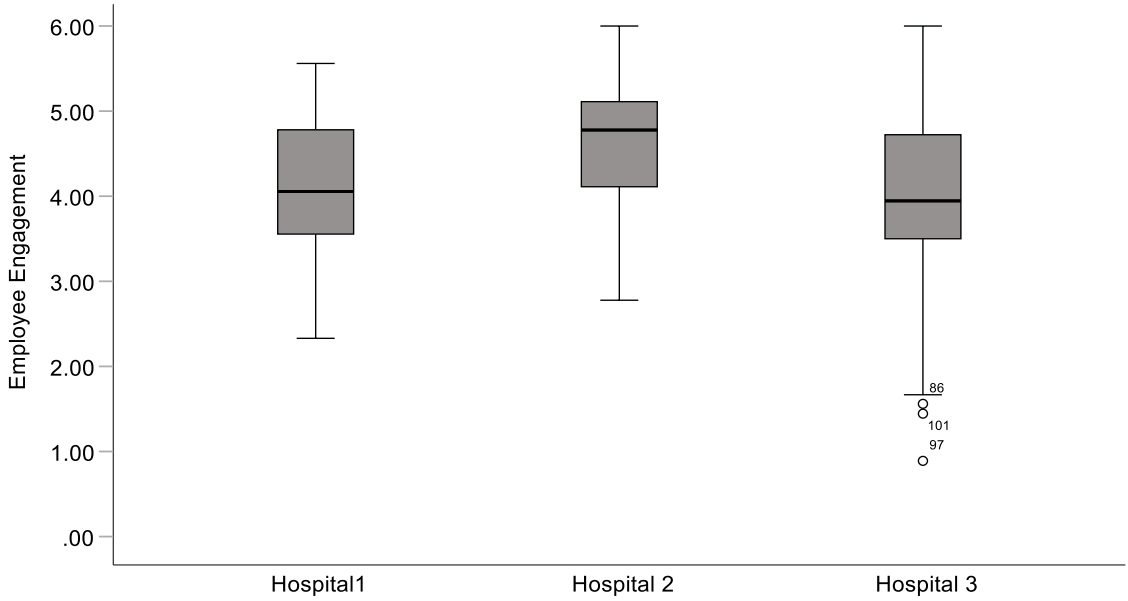
Lean Maturity Box Plot



Note. One outlier is observed for Hospital 2 and Hospital 3.

Figure 12

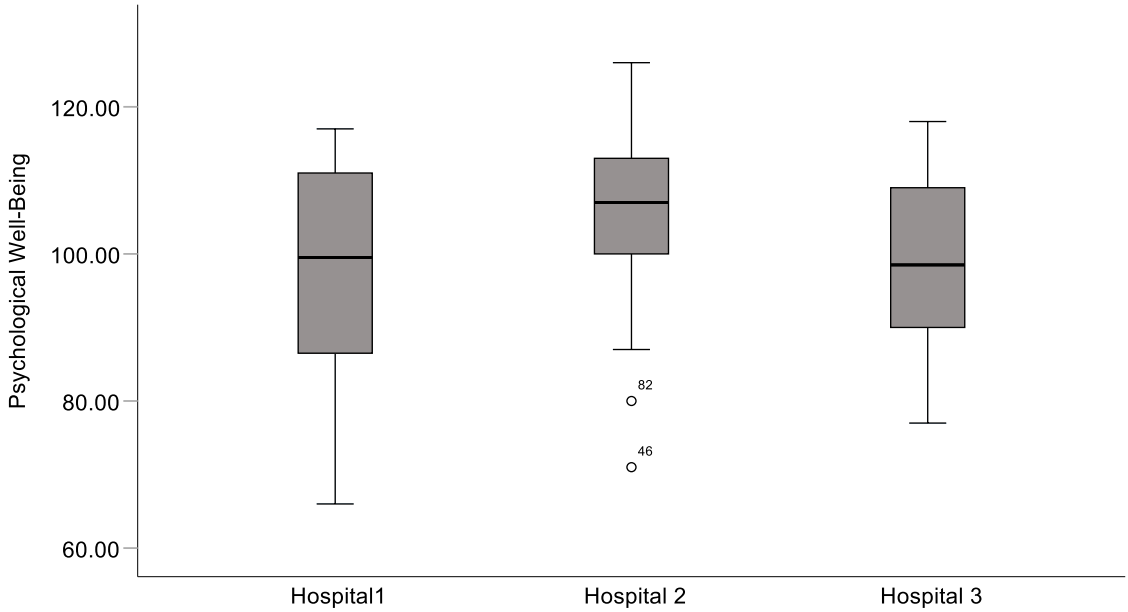
Employee Engagement Box Plot



Note. Three outliers are observed in Hospital 3.

Figure 13

Psychological Well-Being Box Plots



Note. Two outliers are observed for Hospital 2.

Table 3

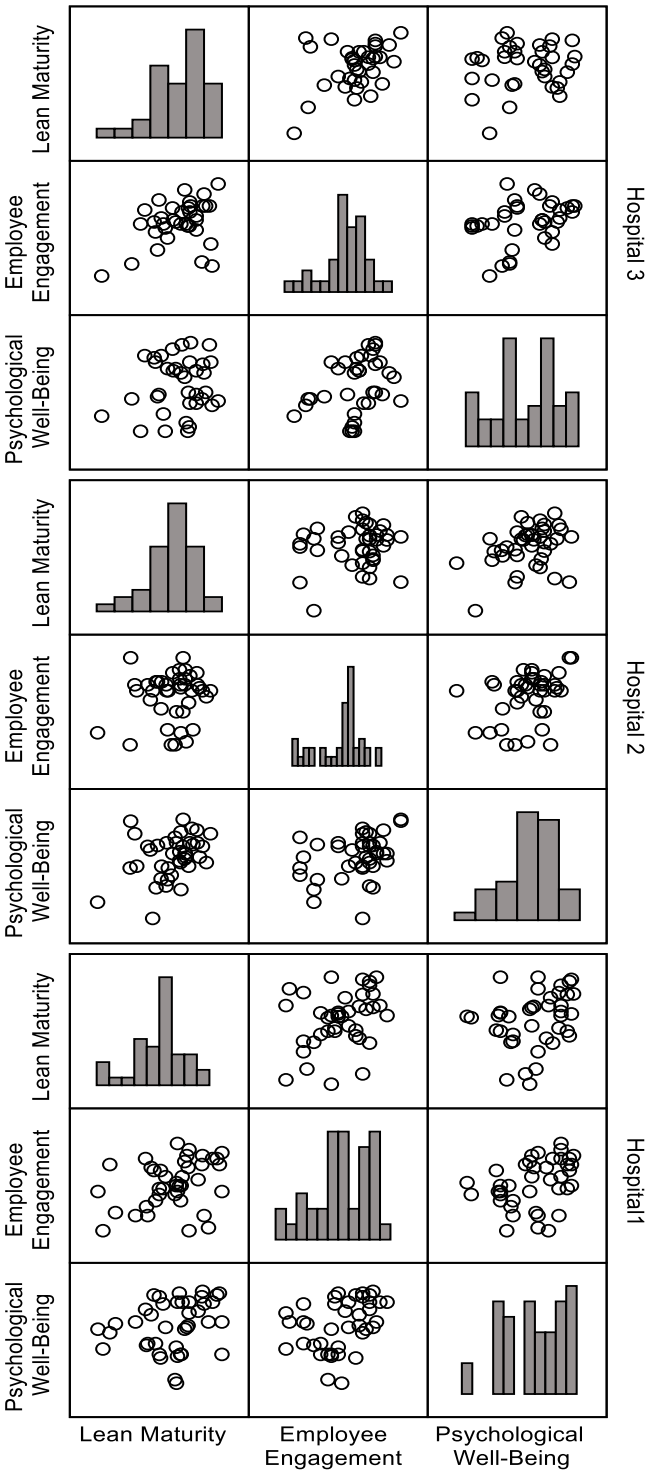
Tests of Normality

		Shapiro-Wilk		
		Statistic	df	Sig.
Lean Maturity	Hospital 1	.954	40	.106
	Hospital 2	.942	41	.036
	Hospital 3	.948	36	.088
Employee Engagement	Hospital 1	.959	40	.152
	Hospital 2	.891	41	.001
	Hospital 3	.939	36	.048
Psychological Well-Being	Hospital 1	.936	40	.025
	Hospital 2	.965	41	.237
	Hospital 3	.943	36	.063

Note. Normality is violated, $p > .05$.

Figure 14

Matix Scatter Plots of Dependent Variables



Note. Linearity is violated based on review of scatter plots.

Table 4

Pearson Correlation of Dependent Variables

		Lean Maturity	Employee Engagement	Psychological Well-Being
Lean Maturity	Pearson Correlation	1	.200	.140
	Sig. (2-tailed)		.031	.133
	N	117	117	117
Employee Engagement	Pearson Correlation	.200	1	.392
	Sig. (2-tailed)	.031		<.001
	N	117	117	117
Psychological Well-Being	Pearson Correlation	.140	.392	1
	Sig. (2-tailed)	.133	<.001	
	N	117	117	117

Note. Association between LM and PWB is not significant, $p > .05$.

The non-parametric Kruskal-Wallis tests assumes normality is violated and independence between samples is tenable (Bower et al., 2022). Therefore, a Kruskal-Wallis test was conducted and demonstrated significant differences between LM, (x^2 (2, N = 117) = 16.90, $p < .001$), EE (x^2 (2, N = 117) = 11.34, $p = .003$), and PWB (x^2 (2, N = 117) = 7.48, $p = .024$) among registered nurses in a hospital setting at three levels: Hospital 1, Hospital 2, and Hospital 3 rejecting the null hypothesis. Post-hoc comparisons using Dunn's method with a Bonferroni correction for multiple tests was conducted. The mean rank of LM (44.70) of Hospital 2 was not significantly lower than the mean rank of LM (55.99) of Hospital 3, $p = .44$. The mean rank of LM (76.38) of Hospital 1 was significantly higher than the mean rank of LM (44.70) of Hospital 2, $p < .001$. The mean rank of LM (55.99) of Hospital 3 was significantly lower than the mean rank of LM (76.38) of Hospital 1, $p = .03$. The mean rank of EE (48.51) of Hospital 3 was not significantly lower than the mean rank of EE (54.05) of Hospital 1, $p = 1.00$. The

mean rank of EE (48.51) of Hospital 3 was significantly lower than the mean rank of EE (73.04) of Hospital 2, $p = .005$. The mean rank of EE (54.05) of Hospital 1 was significantly lower than the mean rank of EE (73.04) of Hospital 2, $p = .04$. The mean rank of PWB (52.15) of Hospital 3 was not significantly lower than the mean rank of PWB (53.21) of Hospital 1, $p = 1.00$. The mean rank of PWB (52.15) of Hospital 3 was not significantly lower than the mean rank of PWB (70.66) of Hospital 2, $p = .051$. The mean rank of PWB (53.21) of Hospital 1 was not significantly lower than the mean rank of PWB (70.66) of Hospital 2, $p = .062$.

Summary

The study design aimed at addressing if there is a difference between LM, PWB and EE among registered nurses in a hospital setting at three levels: Hospital 1, Hospital 2, and Hospital 3. Assumption testing failed for parametric testing. Therefore, a non-parametric test, Kruskal-Wallis test, was conducted. The results of the statistical analysis revealed significant differences between LM, EE, and PWB.

Pairwise comparisons revealed the mean rank of LM of Hospital 2 was not significantly lower than the mean rank of LM of Hospital 3. The mean rank of LM of Hospital 1 was significantly higher than the mean rank of LM of Hospital 2. The mean rank of LM of Hospital 3 was significantly lower than the mean rank of LM of Hospital 1. The mean rank of EE of Hospital 3 was not significantly lower than the mean rank of EE of Hospital 1. The mean rank of EE of Hospital 3 was significantly lower than the mean rank of EE of Hospital 2. The mean rank of EE of Hospital 1 was significantly lower than the mean rank of EE of Hospital 2. The mean rank of PWB of Hospital 3 was not significantly lower than the mean rank of PWB of Hospital 1. The mean rank of PWB

of Hospital 3 was not significantly lower than the mean rank of PWB of Hospital 2. The mean rank of PWB of Hospital 1 was not significantly lower than the mean rank of PWB of Hospital 2. Next, there will be a discussion with implications and limitations followed by recommendations in future research.

CHAPTER 5: DISCUSSION

The purpose of this quantitative study was to examine the differences of Lean implementation in three settings; (a hospital in a health system where Lean is implemented throughout the system, a hospital that has implemented Lean in a health system that has not implemented Lean, a hospital that has not implemented Lean in a health system that has not implemented Lean) between LM, PWB, and EE among nurses in a hospital setting. A discussion will demonstrate what is learned from findings compared to literature reviewed, theoretical constructs, and how findings fit within the Biblical foundation reviewed. Implications will be reviewed regarding how the findings can be used and the impact they have in the healthcare and in psychological practice and consulting. Limitations will be discussed that were discovered during the study followed by recommendations in future research.

Summary of Findings

The results found a significant difference between LM (M = 5.76, SD = 1.35), EE (M = 4.20, SD = 1.02), and PWB (M = 100.81, SD = 13.15) among registered nurses in a hospital setting at three levels of Lean implementation: Hospital 1, Hospital 2, and Hospital 3 rejecting the null hypothesis. Comparisons between hospitals revealed significant and non-significant differences. The mean rank of LM (44.70) of Hospital 2 was not significantly lower than the mean rank of LM (55.99) of Hospital 3. The mean rank of LM (76.38) of Hospital 1 was significantly higher than the mean rank of LM (44.70) of Hospital 2. The mean rank of LM (55.99) of Hospital 3 was significantly lower than the mean rank of LM (76.38) of Hospital 1. The mean rank of EE (48.51) of Hospital 3 was not significantly lower than the mean rank of EE (54.05) of Hospital 1.

The mean rank of EE (48.51) of Hospital 3 was significantly lower than the mean rank of EE (73.04) of Hospital 2. The mean rank of EE (54.05) of Hospital 1 was significantly lower than the mean rank of EE (73.04) of Hospital 2. The mean rank of PWB (52.15) of Hospital 3 was not significantly lower than the mean rank of PWB (53.21) of Hospital 1. The mean rank of PWB (52.15) of Hospital 3 was not significantly lower than the mean rank of PWB (70.66) of Hospital 2. The mean rank of PWB (53.21) of Hospital 1 was not significantly lower than the mean rank of PWB (70.66) of Hospital 2.

Discussion of Findings

The present study demonstrates differences with Lean implementations between LM, EE, and PWB among nurses in a hospital setting between three levels: Hospital 1, Hospital 2, and Hospital 3. The significant differences found in the study were LM of H1 was higher than LM of H2 and H3, EE of H3 was lower than EE of H2, and EE of H1 was lower than EE of H2. Based on these findings, a Lean implementation alone may not be enough of a resource to influence EE and PWB, however, does influence LM within the JDR construct. Beraldin et al. (2019) demonstrated Lean implementations with soft practices such as management support, employee participation, small group participation such as huddles, top management leadership for Lean, coaching of Lean, and solicitation of employee ideas serve as job resources within the JDR construct. Job demands that are technical training such as just in time training that creates a physical or mental effort on work pace without soft lean practices are contraindicative to EE and PWB.

A lean implementation within a healthcare system that has implemented Lean as a resource significantly improved the LM of H1. However, a lean implementation in a healthcare system that has not implemented Lean does not demonstrate a significant

difference between H2 (hospital that has implemented Lean) and H3 (hospital that has not implemented Lean). The findings support that an overall systemic Lean implementation better supports a hospital perception of LM. This is consistent with change management behaviors needed with top leaders to support company goals while leading a Lean implementation (Jansen, et al., 2016). Based on Bouville and Alis (2014), the lack of systemic leadership with a Lean implementation could explain the non-significant difference between H2 and H3 with LM. Lean components such as delegation of responsibilities, problems solving, and standardization can have negative relationships with attitudes at work when a non-holistic approach to a Lean implantation is done. Additionally, Lean implementations that lack the tenet of respecting people can cause cultural abandonment due to the pressures of performance expectations. It is important to remember that the pillar of RFP within Lean is the essence of the cultural building blocks to an implementation (Balzer et al., 2019). From a Biblical perspective, the resources that fit within the TRM, as an adjunct to JDR, highlight leadership descriptors such as goodness of leader, top management support, and coaching as a key supportive resource that can improve LM and coupled with other resources to support EE and PWB (Beraldin et al., 2019; Miner & Bickerton, 2020). These findings suggest that a systemic implementation of Lean can better support a hospital perception of LM but does not have an association with EE and PWB without specific JDR constructs that are coupled with a Lean implementation.

Implications

These study findings can help healthcare leaders with a strategic direction on how to implement Lean. A systemic implementation lead by top leaders offers a supportive

model that enhances LM. Focus on additional resources while doing a Lean implementation may enhance the EE and PWB of nurses within the hospital setting. Lean alone may not support EE and PWB. Psychological practice and consulting can assist healthcare leaders with the importance of RFP and other evidence-based resources within the JDR construct to supplement Lean implementations.

Limitations

Response bias and conformity, based on social desirability, may have been a concern with H3. H3 has not done a formal Lean implementation yet survey scores indicated a higher LM, although not significant, than H2 which has gone through a formal Lean implementation. Additional limitations specific to this study are H1 onboarding a new executive leader, Chief Nursing Officer, and H2 and H3 implemented a new electronic medical record, considered a disruptor to operations, during the survey period. Survey fatigue with H2 and H3 could also be a limitation. There were multiple surveys overlapping with nursing personnel at H2 and H3. Generalizability is limited based on a population that is composed of majority females within nursing (Shah et al., 2021) compared to an overall workplace population (Degtiar & Rose, 2023). Participation in the survey compared to the overall population sampled (1,500) was low (N= 118) leading to a limitation of time available or desire to participate being low.

Recommendations for Future Research

This study brings together theoretical constructs from industrial organizational psychology (JDR) and continuous improvement (Lean). The existence of validated research instruments from psychology and continuous improvement such as LHISI-25, UWES-9, and PWB-18 is beneficial to studying these constructs. Future research can

build upon what is learned from system based Lean implementations improving LM in hospitals. Future experimental research designs could couple Lean implementations with more JDR constructs that specifically target EE and PWB while also improving LM.

Summary

A Lean implementation alone may not be enough of a resource to influence EE and PWB, however, does influence LM within the JDR construct. An overall systemic Lean implementation better supports a hospital perception of LM. Focus on additional resources while doing a Lean implementation may enhance the EE and PWB of nurses within the hospital setting. Psychological practice and consulting can assist healthcare leaders with the importance of evidence-based resources within the JDR construct to supplement Lean implementations. Future research could be explored that couples such resources with Lean implementations and the differences or effects on LM, EE, and PWB.

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APPENDIX A: PERMISSIONS FOR RECRUITMENT

Center for Nursing Research
Medical Center Blvd.
Winston Salem NC 27157
336.713.4018
cshuffma@wakehealth.edu

September 9, 2023

Kevin Smith
Chief Operating Officer, High Point Medical Center
Atrium Health
601 N Elm Street
High Point, NC 27262

Dear Mr. Smith:

After careful review of your research proposal entitled *Lean Implementation Difference Between Lean Maturity, Psychological Well-Being, And Employee Engagement of Nurses in a Hospital Setting*, we have decided to grant you permission to invite our nursing staff to participate in your survey as noted below:

☒ We will not provide participant information to Mr. Kevin Smith directly, but we agree to provide his study information to nurses employed at Atrium Health Wake Forest Baptist Medical Center and Atrium Health High Point Medical Center on his behalf, pending approval of his recruitment letter. The letter should state clearly that this study is voluntary, anonymous, and is being done in partial fulfillment of his doctoral degree at Liberty University. The letter should include the name of the project advisor and contact information.

☒ We are requesting a copy of the results upon study completion and/or publication and that you present the results of your study to our Atrium Health Wake Forest Baptist Shared Governance Council or market nursing leadership.

Due to multiple survey studies being conducted across our Enterprise, please let us know as soon as you have obtained Wake Forest IRB approval. The invitation to your survey will be coordinated with other surveys being disseminated to nursing staff. This may result in your survey being disseminated up to eight weeks after IRB approval to ensure that our nursing teams are not overly burdened with survey requests.

Good luck with your project. We look forward to your results.

Sincerely,

[redacted]

Carolyn Huffman, PhD, WHNP
Nurse Scientist
Atrium Health Wake Forest Baptist

cc: Drs. Paula Correa, Libby Pearsall, and Deb Harding

Intermountain Health

9/8/2023

Perry M. Gee, PhD, RN, FAAN
Nurse Scientist
Intermountain Health
36 So State St
Salt Lake City, UT 84111

Dear Kevin Smith:

After careful review of your research proposal entitled LEAN IMPLEMENTATION

DIFFERENCE BETWEEN LEAN MATURITY, PSYCHOLOGICAL WELL-BEING, AND

EMPLOYEE ENGAGEMENT OF NURSES IN A HOSPITAL SETTING

I have decided to grant you permission to conduct your study at Intermountain Health.

☐ [[I/We] will provide our membership list to [your name], and [your name] may use the list to contact our members to invite them to participate in [his/her] research study.

☒ I grant permission for Kevin Smith along with myself as a co-investigator to contact registered nurses to invite them to participate in his research study. Identifying information will be stripped prior to removal from Intermountain Health.

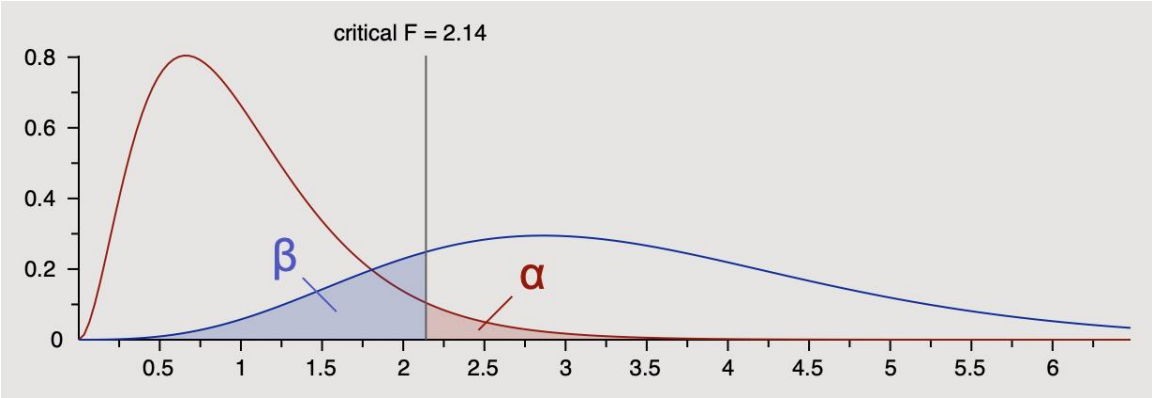
☐ [[I/We] will not provide potential participant information to [your name], but we agree to [[send/provide] [his/her] study information to [description of potential participants] on [his/her] behalf.]

Sincerely,

[redacted]

Perry M. Gee, PhD, Rn, FAAN
Nurse Scientist
Intermountain Health

APPENDIX B: MANOVA SPECIAL EFFECTS AND INTERACTIONS POWER ANALYSIS



Note. $\alpha = .05$, $f^2 = .0625$, power = .80, number of groups (levels of IV) = 3, and response variables (DVs) = 3. Total sample size = 38 for each level.

APPENDIX C: RECRUITMENT EMAIL FOR HOSPITAL IN SYSTEM WITH LEAN

Dear Potential Participant,

Please read the following email for a research opportunity within Intermountain Health. As a graduate student in the School of Behavioral Sciences at Liberty University, I am conducting research as part of the requirements for a doctoral degree. The purpose of my research is to identify if there are differences between maturity of Lean (Continuous Improvement), psychological well-being, and employee engagement among registered nurses in a hospital setting. Participation will also help advance research in healthcare regarding psychological well-being and engagement of caregivers. I am writing to invite you to join my study.

Participants must be a registered nurse working in a hospital setting that has implemented Lean, also referred to as continuous improvement, standard work, and/or huddling. Participants will be asked to take three online surveys. It should take approximately 20-25 minutes to complete the online surveys. Participation will be completely anonymous, and no personal, identifying information will be collected.

To participate in the online surveys click here, SURVEYS LINK. A consent document is provided as the first page of the online surveys. The consent document contains additional information about my research. Because participation is anonymous, you do not need to sign and return the consent document unless you would prefer to do so. After you have read the consent form, please click the link to proceed to the survey/complete and submit the survey. Doing so will indicate that you have read the consent information and would like to take part in the study.

Sincerely,

Kevin Smith, Doctoral Student, Liberty University

[redacted]

APPENDIX D: RECRUITMENT EMAIL FOR HOSPITAL WITH LEAN

Dear Potential Participant,

Please read the following email for a research opportunity within Atrium Health-Wake Forest Baptist- High Point Medical Center. As a graduate student in the School of Behavioral Sciences at Liberty University, I am conducting research as part of the requirements for a doctoral degree. The purpose of my research is to identify if there are differences between maturity of Lean (Continuous Improvement), psychological well-being, and employee engagement among registered nurses in a hospital setting. Participation will also help advance research in healthcare regarding psychological well-being and engagement of caregivers. I am writing to invite you to join my study.

Participants must be a registered nurse working in a hospital setting that has implemented Lean, also referred to as continuous improvement, standard work, and/or huddling. Participants will be asked to take three online surveys. It should take approximately 20-25 minutes to complete the online surveys. Participation will be completely anonymous, and no personal, identifying information will be collected.

To participate in the online surveys click here, SURVEYS LINK. A consent document is provided as the first page of the online surveys. The consent document contains additional information about my research. Because participation is anonymous, you do not need to sign and return the consent document unless you would prefer to do so. After you have read the consent form, please click the link to proceed to the survey/complete and submit the survey. Doing so will indicate that you have read the consent information and would like to take part in the study.

Sincerely,

Kevin Smith, Doctoral Student, Liberty University

[redacted]

APPENDIX E: RECRUITMENT EMAIL FOR HOSPITAL WITHOUT LEAN

Dear Potential Participant,

Please read the following email for a research opportunity within Atrium Health-Wake Forest Baptist- North Carolina Baptist Hospital. As a graduate student in the School of Behavioral Sciences at Liberty University, I am conducting research as part of the requirements for a doctoral degree. The purpose of my research is to identify if there are differences between maturity of Lean (Continuous Improvement), psychological well-being, and employee engagement among registered nurses in a hospital setting. Participation will also help advance research in healthcare regarding psychological well-being and engagement of caregivers. I am writing to invite you to join my study.

Participants must be a registered nurse working in a hospital setting. Participants will be asked to take three online surveys. It should take approximately 20-25 minutes to complete the online surveys. Participation will be completely anonymous, and no personal, identifying information will be collected.

To participate in the online surveys click here, SURVEYS LINK. A consent document is provided as the first page of the online surveys. The consent document contains additional information about my research. Because participation is anonymous, you do not need to sign and return the consent document unless you would prefer to do so. After you have read the consent form, please click the link to proceed to the survey/complete and submit the survey. Doing so will indicate that you have read the consent information and would like to take part in the study.

Sincerely,

Kevin Smith, Doctoral Student, Liberty University

[redacted]

APPENDIX F: INFORMATION SHEET

Information Sheet

Title of the Project: LEAN IMPLEMENTATION DIFFERENCE BETWEEN LEAN MATURITY, PSYCHOLOGICAL WELL-BEING, AND EMPLOYEE ENGAGEMENT OF NURSES IN A HOSPITAL SETTING

Principal Investigator: Kevin Smith, graduate student, School of Behavioral Sciences at Liberty University

Invitation to be Part of a Research Study

You are invited to participate in a research study. To participate, you must be a registered nurse working in a hospital setting. Taking part in this research project is voluntary.

Please take time to read this entire form and ask questions before deciding whether to take part in this research.

What is the study about and why is it being done?

Understanding if there is a difference between maturity of Lean, psychological well-being, and employee engagement among registered nurses in a hospital setting.

What will happen if you take part in this study?

If you agree to be in this study, I will ask you to do the following: Complete basic demographics followed by three surveys that assess maturity of Lean implementation, psychological well-being, and workplace engagement. Completion of the demographics and surveys should take 20-25 minutes.

How could you or others benefit from this study?

Participants should not expect to receive a direct benefit from taking part in this study. Benefits to society include advancing research in healthcare regarding psychological well-being and engagement of nurses.

What risks might you experience from being in this study?

The expected risks from participating in this study are minimal, which means they are equal to the risks you would encounter in everyday life.

How will personal information be protected?

The records of this study will be kept private. Research records will be stored securely, and only the researcher will have access to the records.

- Participant responses will be anonymous.
- Data will be stored in an encrypted database (RedCap), that is password protected. After three years, all electronic records will be deleted.

How will you be compensated for being part of the study?

Participants will not be compensated for participating in this study.

Is the researcher in a position of authority over participants, or does the researcher have a financial conflict of interest?

The researcher serves as the hospital Chief Operating Officer at Atrium Health Wake Forest Baptist- High Point Medical Center. To limit potential or perceived conflicts, data collection will be anonymous, so the researcher will not know who participated. This disclosure is made so that you can decide if this relationship will affect your willingness to participate in this study. No action will be taken against an individual based on his or her decision to participate or not participate in this study.

Is study participation voluntary?

Participation in this study is voluntary. Your decision whether to participate will not affect your current or future relations with Liberty University, Atrium Health Wake Forest Baptist Health, or Intermountain Health. If you decide to participate, you are free to not answer any question or withdraw at any time prior to submitting the survey without affecting those relationships.

What should you do if you decide to withdraw from the study?

If you choose to withdraw from the study, please exit the survey and close your internet browser. Your responses will not be recorded or included in the study.

Whom do you contact if you have questions or concerns about the study?

The researcher conducting this study is Kevin Smith. You may ask any questions you have now. If you have questions later, **you are encouraged** to contact him at [redacted]. You may also contact the researcher's faculty sponsor, Kate Andrews, PhD, at [redacted].

Whom do you contact if you have questions about your rights as a research participant?

If you have any questions or concerns regarding this study and would like to talk to someone other than the researcher, **you are encouraged** to contact the IRB. Our physical address is Institutional Review Board, 1971 University Blvd., Green Hall Ste. 2845, Lynchburg, VA, 24515; our phone number is 434-592-5530, and our email address is irb@liberty.edu.

Disclaimer: The Institutional Review Board (IRB) is tasked with ensuring that human subjects research will be conducted in an ethical manner as defined and required by federal regulations. The topics covered and viewpoints expressed or alluded to by student and faculty researchers are those of the researchers and do not necessarily reflect the official policies or positions of Liberty University.

APPENDIX G: AGREEMENT AND LEAN HEALTHCARE IMPLEMENTATION SELF-ASSESSMENT INSTRUMENT-25

LICENSE AGREEMENT

This license agreement, including all attached exhibits (collectively "**Agreement**"), is effective as of this 10th day of August, 2023 ("**Effective Date**") between THE REGENTS OF THE UNIVERSITY OF CALIFORNIA on behalf of the School of Public Health Center for Lean Engagement and Research ("**CLEAR**") at its Berkeley campus ("**University**"), and Kevin E. Smith, a Doctoral Student at Liberty University, having a principal address at 601 N. Elm St., High Point, NC 27262. ("**Licensee**"). "**Party**" hereinafter refers to each Party individually, or collectively as "**Parties**."

WHEREAS, University has developed the Lean Healthcare Implementation Self-Assessment Instrument ("**LHISI**"), a well-validated, copyrighted tool developed by CLEAR. The 25-item instrument can be fielded to organizational or unit leaders and frontline staff to quantify the extent to which Lean principles and practices exist along 5 key dimensions: Lean Leadership, Commitment, Standard Work, Communication, and Daily Management System; and

WHEREAS, Licensee wishes to license the LHISI ("**Licensed Work**") for use in Lean Implementation Relationship Between Lean Maturity, Psychological Well-being, and Employee Engagement of Nurses in a Hospital Setting (the "**Project**").

WHEREAS, Licensee acknowledges that University owns the intellectual property rights associated with the Licensed Work;

The Parties agree as follows:

1. Grant of Rights. Subject to the limitations set forth in this Agreement, University grants Licensee a royalty-free, non-exclusive, non-transferable, and revocable license to use, the Licensed Work solely in connection with the Project. As part of Licensee's license to use the Licensed Work, Licensee may suggest modifications of the Licensed Work to be made by University ("**Modifications**"). Any and all proposed Modifications and uses thereof will be subject to University's prior approval, and ownership thereof shall vest in University. To the extent that University is not the owner of such Modifications, Licensee hereby irrevocably assigns to University all right, title, and interest (including copyright rights) to and in such Modifications. Licensee will not make any reproduction (nor allow any third parties to make a reproduction) of or from the Licensed Work, in whole or in part, except for use in and as part of the Project. If University in its sole discretion should determine that the Project or Licensed Work contained therein has been used or distributed for any purpose other than what is authorized herein, or that Licensee's use is derogatory or defamatory to University, its campus, employees, or students in any way, University may immediately terminate this Agreement pursuant to Section 9 herein.

2. Permission Language. For any materials containing the Licensed Work or Modifications, Licensee will include the following text near the Licensed Work:
   Displayed by permission of The Regents of the University of California. All rights reserved.

3. Compensation. In consideration for the license granted hereunder, Licensee shall pay University a nonrefundable fee of Twenty Five Hundred U.S. Dollars ($2500.00) upon execution of the

Agreement. All payments from Licensee to University will be made by check payable to "The Regents of the University of California" to an address specified in the invoice or by wire transfer to an account specified in the invoice.

4. Trademark. Licensee will not use any name, trade name, trademark or other designation of University (including contraction, abbreviation or simulation of any of the foregoing) in any other advertising, publicity or other promotional activity for the Licensed Work. Except as set forth in the previous paragraph, Licensee is expressly prohibited from using the name "The Regents of the University of California", "University of California, Berkeley", or "University Berkeley" in any other advertising, publicity, or other promotional activity, without prior written permission of University. Any trademarks, service marks, design marks, logos or trade dress included in the Licensed Work remains vested in the exclusive owners of such marks or trade dress, and no license to such marks is granted by this Agreement. No title or intellectual property rights of any nature in and to the Licensed Work, except for the license granted herein, are transferred to Licensee by this Agreement. If there are any incidental trademarks or logos contained in the Licensed Work (including, without limitation, those of University Berkeley's Educational Technology Services or others owned by The Regents of the University of California), Licensee will not alter or use such marks in any way that implies an association with or an endorsement by the owner(s) of such logos or trademarks. University does not grant any license or right under this Agreement to any trademark, service mark, trade dress or logo or to any third party footage, photographs or copyrighted images that appear in the Licensed Work, and such rights are expressly withheld.

5. Copyright Ownership. Nothing in this Agreement, including the grant provided above, will in any way affect the continued and separate copyright ownership interests of University in and to the Licensed Work and Modifications.

6. Infringement. Licensee acknowledges and agrees that any unauthorized or unlicensed use of any Licensed Work by Licensee constitutes infringement of copyright and other applicable laws and will entitle University to exercise all rights and remedies available at law or in equity, including monetary damages, against all users and beneficiaries of the use of such Licensed Work. If, for any reason, the Licensed Work comes into the possession of any unauthorized third person, firm or corporation while it is in Licensee's control and regardless of the reason(s), Licensee agrees to undertake reasonable efforts to recover the Licensed Work and to cooperate fully with University in recovering any damages sustained by University by reason of the unauthorized use.

7. Representations and Warranties by Licensee. Licensee represents and warrants that:
   a. Licensee's use of the Licensed Work will comply with the terms and conditions in this Agreement.
   b. Neither Licensee, its agents, its independent contractors, nor any entity involved in the Project, its distribution or its exhibition will assert any rights inconsistent with University's copyrights or other rights. Licensee will include in every contract it enters into with subcontractors, independent contractors, or others, provisions consistent with its warranties and agreements hereunder;
   c. Licensee will not store or share the Licensed Work via a database, library, image, video or audio storage network, configuration or similar arrangement, except as required to incorporate the Licensed Work in this Project and as authorized herein and solely up to the time the Project is completed, or as otherwise set forth in this Agreement;

d. Unless authorized in advance in writing by University, Licensee will not use the Licensed Work or any part thereof as a stand-alone clip, template, stand-alone background, stock element or effects imagery element, downloadable file, or any other clip media/stock product, whether as part of another library, collection, or clip for distribution or resale, except as required to incorporate the Licensed Work in this Project; and
e. Licensee will not permit the Licensed Work to be available in any medium in a manner that enables third parties to download, extract or access the Licensed Work as a stand-alone file. Licensee will not directly or indirectly reproduce the Licensed Work in any secondary reproductions such as screen shots, in-context promotions or on file-sharing or social networking websites such as YouTube, Facebook, Twitter, etc., unless authorized in advance by University in writing.

8. Representations and Warranties by University. University represents and warrants that it has the right to enter into this Agreement and to grant the rights granted herein. University provides no other representations or warranties of any kind, expressed or implied.

9. Term. The term of this Agreement will commence on the Effective Date and will terminate on August 10, 2024, unless terminated earlier as set forth herein.

10. Termination. Either Party may terminate this Agreement for any reason by providing thirty (30) days written notice to the other Party, or immediately in the event of a material breach of this Agreement. Termination for breach shall not affect a Party's rights arising out of the breach.

11. Disclaimer of Endorsement. Licensee may not imply or insinuate or state that University or its employees in any way support, endorse, recommend, and/or advocate any product, company, idea, or brand.

12. DISCLAIMER. UNIVERSITY DISCLAIMS ALL WARRANTIES IN CONNECTION WITH THE LICENSED WORK AND ANYTHING ELSE LICENSED UNDER THIS AGREEMENT. UNIVERSITY MAKES NO REPRESENTATION OR WARRANTY REGARDING THE ACCURACY OR COMPLETENESS OF THE LICENSED WORK, OR THAT THE LICENSED WORK WILL NOT INFRINGE ANY COPYRIGHT, TRADEMARK, OR OTHER PROPRIETARY RIGHT.

13. LIMITATION OF LIABILTY. UNIVERSITY WILL NOT BE LIABLE FOR ANY DAMAGE OR LOSS – INCLUDING LOST PROFITS, COSTS OF PROCURING SUBSTITUTE GOODS OR SERVICES, LOST BUSINESS, ENHANCED DAMAGES FOR INTELLECTUAL PROPERTY INFRINGEMENT OR ANY DIRECT, INDIRECT, INCIDENTAL, CONSEQUENTIAL, PUNITIVE OR OTHER SPECIAL DAMAGES – RESULTING FROM EXERCISE OF THIS LICENSE OR LICENSEE'S USE OF THE LICENSED WORK. UNIVERSITY WILL NOT BE LIABLE FOR ANY CAUSES OF ACTION OF ANY KIND (INCLUDING TORT, CONTRACT, NEGLIGENCE, STRICT LIABILITY AND BREACH OF WARRANTY), EVEN IF UNIVERSITY HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

14. Indemnification. Licensee will indemnify, hold harmless and defend University, University's officers, employees, and agents, and the authors of the Licensed Work from and against any and all liability, claims, suits, losses, damages, costs, fees and expenses resulting from or arising out of this Agreement.

15. No Other Rights Granted; No Third-Party Beneficiaries. Nothing in this Agreement grants by implication, estoppel, or otherwise any right to University's intellectual property except as explicitly set forth herein. No provisions of this Agreement are intended or shall be construed to confer upon or give to any person or entity other than University and Licensee any rights, remedies or other benefits under, or by reason of, this Agreement.

16. Assignment. Neither Party may assign this Agreement without the prior written consent of the other Party.

17. Governing Law and Venue. This Agreement is to be interpreted, governed and enforced in accordance with the laws of the State of California, without regard to its conflict of law principles. All claims arising out of or relating to this Agreement will be litigated exclusively in the federal or state courts, as applicable, located in Alameda County, California, and the Parties hereby expressly consent to the venue and jurisdiction in those courts.

18. Headings and Construction. The headings are provided for convenience only and will not be used in interpreting any provision of this Agreement. No rule of strict construction shall apply to or be used against either Party as a consequence of such Party's authorship of any provision of this Agreement. As used in this Agreement, the words "include," "including" and their variants are to be construed as if followed by the words "without limitation" or "but not limited to."

19. Entire Agreement. This Agreement, including all attached exhibits and schedules, constitutes the entire agreement of the Parties with respect to the subject matter hereof, and supersedes all prior agreements and understandings, both written and oral, among the Parties with respect to the subject matter of this Agreement.

20. Amendment. No amendment or modification of this Agreement will be valid or binding upon the Parties unless made in writing and signed by each Party.

21. Severability. If any provision of this Agreement, or portion thereof, is held by a court of competent jurisdiction to be contrary to law or otherwise unenforceable, that provision will be modified by the court and interpreted so as best to accomplish the objectives of the original provision to the fullest extent permitted by law, and the remaining provisions of this Agreement will remain in full force and effect.

22. Notices. Notice pursuant to this Agreement will be in writing to the below addresses or to such other address that either Party may later designate in writing to the other. Notice will be effective on the business day sent by fax or e-mail or delivered personally, or three business days after the date of deposit with the U.S. Postal Service, certified mail, return receipt requested

University's representative for all purposes will be:

Name: Dorothy Y. Hung, Ph.D.
Address: 50 University Hall Room 517
Berkeley, CA 94702
Email: dorothy.hung@berkeley.edu

Licensee's representative for all purposes will be:

[redacted]

23. Waiver. Any waiver by University of a breach of or a default under any of the provisions of this Agreement, or the failure of University to enforce any of the provisions of this Agreement or to exercise any right or privilege hereunder will not thereafter be construed as a waiver by University of any subsequent breach or default of a similar nature, or as a waiver of any of such provisions, rights or privileges hereunder.

24. Counterparts. This Agreement may be executed in one or more counterparts, all of which will be considered one and the same agreement and will become effective when one or more counterparts have been signed by each Party and delivered to the other Party.

KEVIN E. SMITH

[redacted]
(Signature)

Kevin E. Smith, Doctoral Student

Date: 8/27/23

THE REGENTS OF THE UNIVERSITY OF CALIFORNIA

[redacted]
(Signature)

Michèle Huff, Executive Director, BCBP

Date: 8/24/23

Lean Healthcare Implementation Self-Assessment Instrument (LHISI-25)

For each of the following 25 statements, please rate (on the 0-8 scale) the extent to which it is true within your primary work location and unit or area of responsibility. Choose the selection that most accurately corresponds to your experience and only select "Don't Know" where the meaning is unclear or you do not have any relevant knowledge.

Statement	Never 0	1	2	3	4	5	6	7	Always 8	Don't know N/A
1. Across my hospital/clinic, leaders at all levels create a safe environment for exposing problems.										
2. Across my hospital/clinic, senior leaders practice humble inquiry when interacting with employees at all levels of the organization.										
3. Across my hospital/clinic, leaders at all levels engage employees where the work happens.										
4. Across my hospital/clinic, leaders at all levels create and sustain an environment of continuous improvement and continuous learning.										
5. In my unit/department, senior leaders have made an explicit commitment to patient-centered care.										
6. In my unit/department, senior leaders follow a process for strategy definition and deployment that provides focus at all levels.										
7. Across my hospital/clinic, leaders at all levels coach to ensure a clear connection										

between purpose and the work being performed.
8. Across my hospital/clinic, leaders at all levels provide employees and staff regular feedback.
9. In my unit/department, senior leaders make data driven decisions.
10. Across my hospital/clinic, successes gained and failures are shared.
11. In my unit/department, management staff use PDSA thinking with the operational units they lead.
12. In my unit/department, management staff are committed to Lean.
13. In my unit/department, physicians are committed to Lean.
14. Lean has a sponsor/champion and clinical and management staff who demonstrate visible, active, public commitment and support of Lean.
15. In my unit/department, management staff practice A3 thinking.
16. In my unit/department, use of standard work is monitored for compliance.
17. In my unit/department, clinical staff use standard work.
18. In my unit/department, senior leaders use standard work.

19. In my unit/department, work processes are standardized.	
20. In my unit/department, those who provide care to patients/customers communicate with each other.	
21. In my unit/department, the communication that occurs among those who provide care to patients/customers is focused on problem-solving rather than blaming each other or others.	
22. In my unit/department, those who provide care to patients/customers share common goals.	
23. In my unit/department, clinical staff attend daily huddles.	
24. In my unit/department, management staff attend daily huddles.	
25. In my unit/department, a daily management system (e.g., daily huddles, gemba walks, etc) is used.	

APPENDIX H: PUPLIC USE PERMISSION AND PSYCHOLOGICAL WELL-BEING-18

Psychological Wellbeing Scale

Factor: Power and Autonomy

Age: Adult

Duration: 3 to 5 minutes (18-item), 6 to 8 minutes (42-item)

Reading Level: 6th-8th grade

What

Developed by psychologist Carol D. Ryff, the 42-item Psychological Wellbeing (PWB) Scale measures six aspects of wellbeing and happiness: autonomy, environmental mastery, personal growth, positive relations with others, purpose in life, and self-acceptance (Ryff et al., 2007; adapted from Ryff, 1989).

Who

Researchers have used both the 42-item PWB Scale and a shortened 18-item version (Ryff & Keyes, 1995) with American adults of all ages, including those from lower-income backgrounds (Ryff & Keyes, 1995; Curhan et al., 2014). The 18-item scale has also been used with Latinx college students (Gloria, Castellanos, Scull, & Villegas, 2009), African-Americans living in New York, and Mexican-Americans living in Chicago (Ryff, Keyes, & Hughes, 2003).

How

INSTRUCTIONS

Respondents rate how strongly they *agree* or *disagree* with 42 statements using a 7-point scale (1 = strongly agree; 7 = strongly disagree).

The PWB Scale has six subscales: *Autonomy* (e.g., “I have confidence in my opinions, even if they are contrary to the general consensus”); *Environmental Mastery* (e.g., “In general, I feel I am in charge of the situation in which I live”); *Personal Growth* (e.g., “I think it is important to have new experiences that challenge how you think about yourself and the world”); *Positive Relations With Others* (e.g., “People would describe me as a giving person, willing to share my time with others”); *Purpose in Life* (e.g., “Some people wander aimlessly through life, but I am not one of them”); and *Self-acceptance* (e.g., “When I look at the story of my life, I am pleased with how things have turned out”).

Researchers later reverse-code 21 items so that higher scores indicate greater wellbeing, and then calculate separate subscale scores by summing all items within each subscale.

RESPONSE FORMAT

1 = strongly agree; 2 = somewhat agree; 3 = a little agree; 4 = neither agree or disagree; 5 = a little disagree; 6 = somewhat disagree; 7 = strongly disagree.

Use this Measure (18 items)

Use this Measure (42 items)

All Survey Questions (18-item version)

All Survey Questions (42-item version)

Why It Matters

Researchers have found that Americans who feel they hold a higher status in society (as measured by the MacArthur Subjective Social Status measure) have better wellbeing. In fact, feelings of status are more strongly related to wellbeing than objective markers of status like education level (Curhan et al., 2014). Research using the 18-item PWB Scale has shown that experiences of daily discrimination are associated with worse wellbeing. But adults have better wellbeing when they remember having had supportive and affectionate relationships with their parents in childhood (An & Cooney, 2016). Additionally, multiple studies have found that education is associated with better wellbeing (Ryff, Keyes, & Hughes, 2003; Keyes, Shmotkin, & Ryff, 2002). Because education is both an indicator of status and a path out of poverty (Card, 2001), PWB may be an important link to mobility.

HEADS UP

The 42-item scale is more statistically sound than the 18-item version (Ryff et al., 2007) but it takes longer to administer.

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Ryff, C. D. (1989). Happiness is everything, or is it? Explorations on the meaning of psychological well-being. *Journal of Personality and Social Psychology, 57,* 1069-1081.

Ryff, C. D., Almeida, D. M., Ayanian, J. S., Carr, D. S., Cleary, P. D., Coe, C., … Williams, D. (2007). *National Survey of Midlife Development in the United States (MIDUS II), 2004-2006: Documentation of the Psychosocial Constructs and Composite Variables in MIDUS II Project 1*. Ann Arbor, MI: Inter-university Consortium for Political and Social Research.

Ryff, C. D., & Keyes, C. L. M. (1995). The structure of psychological well-being revisited. *Journal of Personality and Social Psychology*, *69*(4), 719–727.

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Psychological Well-being

Instructions: Circle one response below each statement to indicate how much you agree or disagree.

1. "I like most parts of my personality."

Strongly agree	Somewhat agree	A little agree	Neither agree nor disagree	A little disagree	Somewhat disagree	Strongly disagree

2. "When I look at the story of my life, I am pleased with how things have turned out so far."

Strongly agree	Somewhat agree	A little agree	Neither agree nor disagree	A little disagree	Somewhat disagree	Strongly disagree

3. "Some people wander aimlessly through life, but I am not one of them."

Strongly agree	Somewhat agree	A little agree	Neither agree nor disagree	A little disagree	Somewhat disagree	Strongly disagree

4. "The demands of everyday life often get me down."

Strongly agree	Somewhat agree	A little agree	Neither agree nor disagree	A little disagree	Somewhat disagree	Strongly disagree

5. "In many ways I feel disappointed about my achievements in life."

Strongly agree	Somewhat agree	A little agree	Neither agree nor disagree	A little disagree	Somewhat disagree	Strongly disagree

6. "Maintaining close relationships has been difficult and frustrating for me."

Strongly agree	Somewhat agree	A little agree	Neither agree nor disagree	A little disagree	Somewhat disagree	Strongly disagree

7. “I live life one day at a time and don't really think about the future.”

Strongly agree	Somewhat agree	A little agree	Neither agree nor disagree	A little disagree	Somewhat disagree	Strongly disagree

8. “In general, I feel I am in charge of the situation in which I live.”

Strongly agree	Somewhat agree	A little agree	Neither agree nor disagree	A little disagree	Somewhat disagree	Strongly disagree

9. “I am good at managing the responsibilities of daily life.”

Strongly agree	Somewhat agree	A little agree	Neither agree nor disagree	A little disagree	Somewhat disagree	Strongly disagree

10. “I sometimes feel as if I've done all there is to do in life.”

Strongly agree	Somewhat agree	A little agree	Neither agree nor disagree	A little disagree	Somewhat disagree	Strongly disagree

11. “For me, life has been a continuous process of learning, changing, and growth.”

Strongly agree	Somewhat agree	A little agree	Neither agree nor disagree	A little disagree	Somewhat disagree	Strongly disagree

12. “I think it is important to have new experiences that challenge how I think about myself and the world.”

Strongly agree	Somewhat agree	A little agree	Neither agree nor disagree	A little disagree	Somewhat disagree	Strongly disagree

13. “People would describe me as a giving person, willing to share my time with others.”

Strongly agree	Somewhat agree	A little agree	Neither agree nor disagree	A little disagree	Somewhat disagree	Strongly disagree

14. “I gave up trying to make big improvements or changes in my life a long time ago”

Strongly agree	Somewhat agree	A little agree	Neither agree nor disagree	A little disagree	Somewhat disagree	Strongly disagree

15. “I tend to be influenced by people with strong opinions”

Strongly agree	Somewhat agree	A little agree	Neither agree nor disagree	A little disagree	Somewhat disagree	Strongly disagree

16. “I have not experienced many warm and trusting relationships with others.”

Strongly agree	Somewhat agree	A little agree	Neither agree nor disagree	A little disagree	Somewhat disagree	Strongly disagree

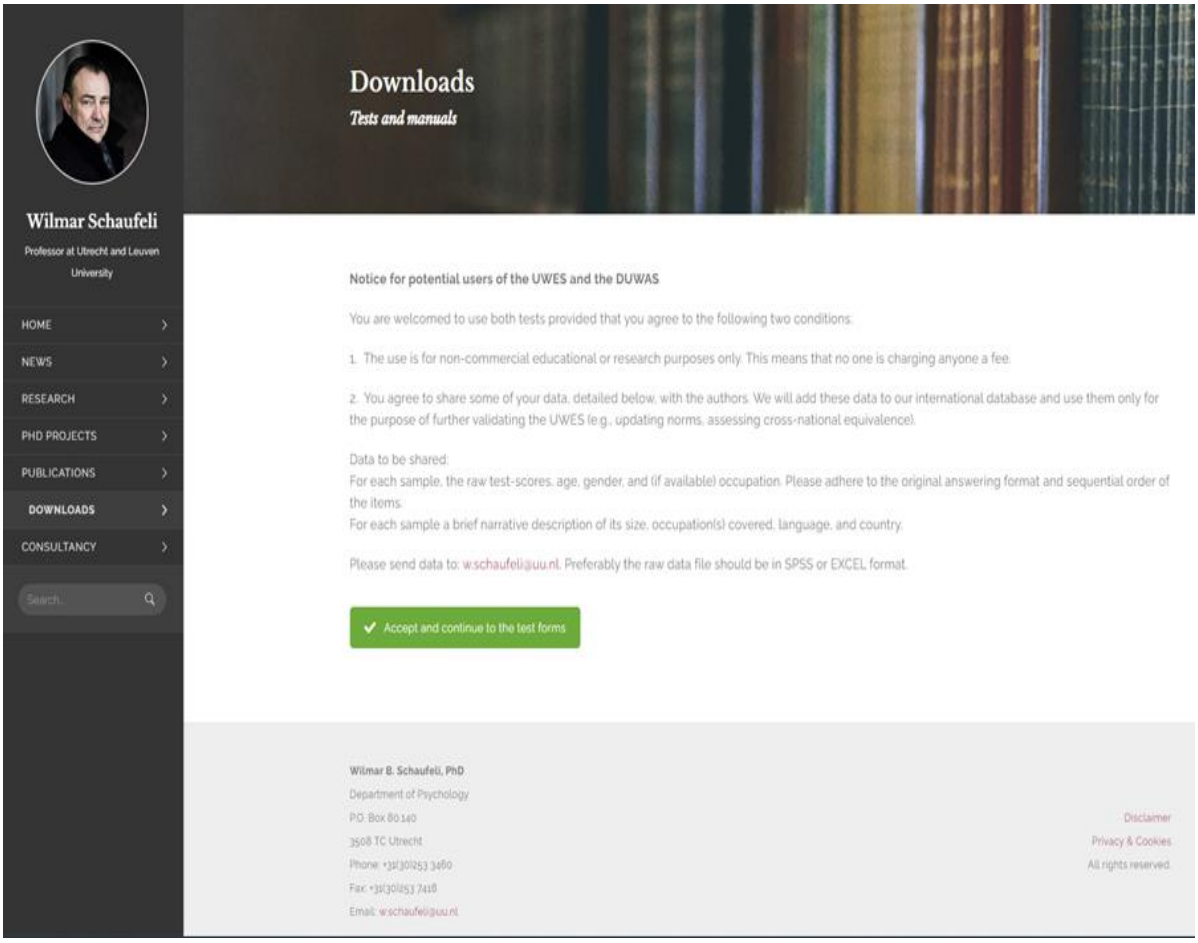
17. “I have confidence in my own opinions, even if they are different from the way most other people think.”

Strongly agree	Somewhat agree	A little agree	Neither agree nor disagree	A little disagree	Somewhat disagree	Strongly disagree

18. “I judge myself by what I think is important, not by the values of what others think is important.”

Strongly agree	Somewhat agree	A little agree	Neither agree nor disagree	A little disagree	Somewhat disagree	Strongly disagree

APPENDIX I: PERMISSION AND ULTRECHT WORK ENGAGMENT-9



Work Engagement Survey

The following 9 statements are about how you feel at work. Please read each statement carefully and decide if you ever feel this way about your job. If you have never had this feeling, cross the "0" (zero) in the space after the statement. If you have had this feeling, indicate how often you felt it by crossing the number (from 1 to 6) that best describes how frequently you feel that way.

Never	Almost Never	Rarely	Sometimes	Often	Very Often	Always
0	1	2	3	4	5	6
Never	A few times a year or less	Once a month or less	A few times a month	Once a week	A few times a week	Every day

1. At my work, I feel bursting with energy.
2. At my job, I feel strong and vigorous.
3. I am enthusiastic about my job.
4. My job inspires me.
5. When I get up in the morning, I feel like going to work.
6. I feel happy when I am working intensely.
7. I am proud of the work that I do.
8. I am immersed in my work.
9. I get carried away when I am working.